U-matic SP

VIDEO CASSETTE PLAYER

VP-9000P

VOL-1

SONY®

SERVICE MANUAL

SPECIFICATIONS

System

Video signal system	CCIR standards, PAL color

Video

Outputs	VIDEO OUT 1, 2 (BNC type) ×1 each 1.0 Vp-p ±0.2 Vp-p, 75 ohms, unbalanced sync negative DUB OUT (7-pin) ×1 TV (8-pin) ×1
Horizontal resolution	SP mode: 300 lines (both B/W and color) High-band: 260 lines (both B/W and color) Low-band: 250 lines (both B/W and color)
S/N	Color: more than 46 dB Luminance (Y): more than 48 dB
Sync signal input	SYNC IN (BNC type) ×1 2.5 Vp-p (2 to 5 Vp-p), 75 ohms, unbalanced
RF OUT (OFF TAPE)	(BNC type) ×1 0.5 (0.3 to 1.0) ±0.1 Vp-p, 75 ohms, unbalanced

Audio

Outputs	AUDIO LINE OUT CH-1/L, CH-2/R (XLR 3-pin male) ×1 each + 4 dB (at 600 ohm load), balanced AUDIO MONITOR (phono jack) ×1 −5 dB (at 47 k ohm load) TV (8 pin) ×1 HEADPHONES (stereo phone jack) For 8-ohm headphones Level adjustable (from −26 to −46 dB)
S/N	With Dolby NR off 52 dB (KSP, KSP-S tapes) 50 dB (KCA, KCS tapes) (both channel 1 and 2 at 3% distortion)
Frequency response	50 to 15,000Hz (both audio channel 1 and 2 with Dolby NR off)

Other functions

Memory backup of programmed operation	3 years from shipment
Pause	A still picture is obtained with long pause function
Search	Still, $^1/_{30}$ to 5 times normal speed in both forward and reverse directions With RM-580 and RM-500: picture search with 8 times normal speed (both KSP and KSP-S tapes)
Tracking control	Possible
Skew control	Possible
Sync system	Automatic switching between internal and external
Dropout compensator	Built-in

Tape transport

Tape speed	95.3 mm/sec.
Playback time	Approx. 60 minutes (with KSP-60)
Fast forward and rewind time	Within 4 minutes (with KSP-60)
Wow and flutter	Less than ±0.23% p-p (DIN)
Tape compatibility	U-matic video cassette tapes
Usable tapes	KSP, KSP-S, KCA, KCS type

General

Power requirements	198 - 264V AC, 48 – 64Hz
Power consumption	70 W (with the RM-580 and RF kit)
Operating position	Horizontal
Storage temperature	−20°C to + 60°C (−4°F to + 140°F)
Operating temperature	5°C to 40°C (41°F to 104°F)
Dimensions	424 × 192 × 492 mm (w/h/d) ($16\frac{3}{4} \times 7\frac{5}{8} \times 19\frac{3}{8}$ inches) including projecting parts and controls
Weight	Approx. 18 kg (39 lb 11 oz)
Supplied accessories	Operating instructions (1) RF modulator compartment cover (1) AC power cord (1)

Optional accessories

BKU-701 computer interface board
FCG-700 frame code generator
RX-707 auto search control unit (for RS-232C interface)
RX-353CE, RX-303CE auto search control unit (for 33-pin interface)
RM-690 remote control unit (for REMOTE connector)
RM-580, RM-500 remote control unit (for 33-pin interface)
RFK-660UCE/660UB/660UF/660CH RF kit
RMM-507 rack mount kit
RM-555 multi remote control unit

TABLE OF CONTENTS

VOL-1

1. GENERAL DESCRIPTION

1-1. Features 1-1
1-2. Location of Parts and Controls 1-2
1-3. Connection 1-8
  1-3-1. Connection to a Video Monitor 1-8
  1-3-2. Connection to a VTR 1-9
  1-3-3. Connection to a Stereo System 1-10
  1-3-4. Connection to a TV Receiver 1-10
  1-3-5. Connection to Headphones 1-11
1-4. To View a Picture on a TV Receiver 1-12
  1-4-1. Installing the RF Modulator 1-12
  1-4-2. Connection to a Color TV Receiver 1-13
1-5. Operation 1-14

2. SERVICE INFORMATION

2-1. Removal of Cabinet 2-1
2-2. How to Service the Printed Circuit Board ... 2-3
  2-2-1. AU-82A, AU-89A, SV-93E and SY-106A Boards 2-3
  2-2-2. VP-26 Board 2-3
  2-2-3. PD-40A Board 2-3
  2-2-4. IF-132 Board 2-3
2-3. Main Parts Location 2-5
  2-3-1. Location of the Printed Circuit Board .. 2-5
  2-3-2. Location of the Mechanical Main Parts/Components 2-7
2-4. Printed Circuit Board 2-9
2-5. Connectors 2-9
2-6. Output Signal of the Connector 2-9
2-7. Spare Parts 2-10
2-8. Select Switch Setting 2-10
2-9. How to Operate the Machine without Installing a Cassette Tape 2-10
2-10. Cassette Removal Procedure when Normal Ejection is not Possible 2-11
2-11. Diagnostic Function in System Controller 2-12
  2-11-1. Outline of Self Diagnosis 2-12
  2-11-2. Diagnosis Method 2-12
  2-11-3. Troubleshooting 2-13
  2-11-4. Diagnosis List 2-14
  2-11-5. Mode Conversion Diagram and Timing Chart 2-18
2-12. Fixture 2-35

3. PERIODIC CHECK AND MAINTENANCE

3-1. Maintenance after Repairs 3-1
3-2. Periodic Check 3-1
3-3. Others 3-1

4. REPLACEMENT OF MAJOR PARTS

4-1. Replacement of the Upper Drum 4-1
4-2. Replacement of the Drum Assembly 4-2
4-3. Replacement of the Capstan Motor 4-3
4-4. Replacement of the CTL Head 4-3
4-5. Replacement of the S Drawer Roller 4-4
4-6. Replacement/Adjustment of the Tape Guides on the Threading Ring 4-5
4-7. Replacement of the Audio/CTL Head 4-6
4-8. Replacement of the Threading Ring 4-7
4-9. Replacement of the Pinch Roller 4-8
4-10. Replacement of the Threading Gear Box System 4-8
  4-10-1. Replacement of the Threading Gear Box 4-8
  4-10-2. Replacement of the Threading Motor ... 4-9
  4-10-3. Replacement of the Threading Belt 4-10
4-11. Items to be Adjusted after Main Parts Replacement 4-11

5. LINK AND DRIVE SYSTEM ALIGNMENT

5-1. Reel Table System Adjustment 5-1
  5-1-1. Cassette Holder Position Adjustment ... 5-1
  5-1-2. Reel Table Height and Vertical Play Adjustment 5-2
5-2. T Drawer Arm Adjustment 5-4
  5-2-1. T Drawer Arm Eject Position Adjustment 5-4
  5-2-2. Unthread-end Switch Position Adjustment 5-4
5-3. Threading System Adjustment 5-5
  5-3-1. Threading Ring Rotation Adjustment ... 5-5
  5-3-2. Gear Box Installing Position Adjustment 5-6
  5-3-3. Pinch Roller Self Alignment Adjustment 5-7
  5-3-4. FR Detector Block Installing Position Adjustment 5-8
5-4. Pinch Lever Block Adjustment 5-9
  5-4-1. Pinch Lever Preset Adjustment 5-9
  5-4-2. Pinch Roller Preset Adjustment 5-10
  5-4-3. Pinch Solenoid Block Position Adjustment 5-11
5-5. T Tape Sensor Position Adjustment 5-12
5-6. Tension Arm System Adjustment 5-13
  5-6-1. S Drawer Roller Block Limiter Adjustment 5-13
  5-6-2. T Tension Regulator Operating Position Adjustment 5-13

5-6-3. S Tension Regulator Operating Position Adjustment 5-14
5-6-4. Tension Detector Position Adjustment .. 5-15
5-6-5. T Tension Regulator Arm Height Adjustment 5-16
5-7. Search Solenoid System Adjustment 5-17
5-7-1. Search Solenoid Installing Position Adjustment 5-17
5-7-2. T Idler Solenoid Position Adjustment ... 5-18
5-7-3. S Idler Solenoid Position Adjustment ... 5-19
5-7-4. Pinch Solenoid Installing Position Adjustment 5-20
5-7-5. T Brake Solenoid Position Adjustment 5-21
5-7-6. S Brake Solenoid Position Adjustment . 5-22
5-8. Cassette-up Compartment Adjustment 5-23
5-8-1. Cassette-in Switch Position Adjustment 5-23
5-8-2. Cassette-down Switch Position Adjustment 5-24
5-9. Leaf Spring Position Adjustment 5-25

6. BACK TENSION AND TORQUE ALIGNMENT

6-1. Brake System Adjustment 6-1
6-1-1. S Brake Torque Adjustment 6-1
6-1-2. T Brake Torque Adjustment 6-2
6-1-3. REW Brake Torque Adjustment 6-3
6-2. F FWD/REW Torque Adjustment 6-4
6-3. FWD Torque Adjustment 6-5
6-4. REV Torque Adjustment 6-6
6-5. F FWD Back Tension Adjustment 6-7
6-6. FWD Back Tension Adjustment 6-8

7. TAPE RUN ALIGNMENT

7-1. F FWD/REW Modes Tape Path Adjustment 7-1
7-2. T Correction Guide Slantness Adjustment ... 7-2
7-3. PLAY Mode Tape Path Adjustment (1) 7-2
7-4. PLAY Mode Tape Path Adjustment (2) 7-3
7-5. REV Mode Tape Path Adjustment 7-4
7-6. Tape Path Adjustment Around Pinch Roller 7-5
7-7. Tracking Adjustment 7-6
7-7-1. Video Tracking Adjustment 7-6
7-7-2. CTL PB Head Height/Azimuth/Zenith Adjustments 7-10
7-7-3. Audio Head Height Adjustment 7-12
7-7-4. Audio Head Zenith Adjustment 7-13
7-7-5. Audio Head Azimuth Adjustment 7-13
7-7-6. Audio Head Phase Adjustment 7-14
7-7-7. Audio/CTL Head Position Adjustment 7-14
7-8. Video Head Dihedral Adjustment 7-15

8. SYSTEM CONTROL ALIGNMENT

8-1. Tape Sensor Balance Adjustment 8-2
8-2. Reel Motor Still Adjustment 8-2

9. SERVO SYSTEM ALIGNMENT

9-1. Capstan Free Speed Adjustment 9-2
9-2. Capstan 1/30 Speed Adjustment 9-2
9-3. Capstan Stop Servo Adjustment (1) 9-3
9-4. Capstan Stop Servo Adjustment (2) 9-3
9-5. Capstan Stop Servo Adjustment (3) 9-3
9-6. Tracking Control Multi and CTL Polarity Adjustment 9-4
9-7. Drum Free Speed Adjustment 9-4
9-8. Drum AFC Level Adjustment 9-5
9-9. Drum AFC Transient Adjustment 9-5
9-10. Instant Start Adjustment 9-6
9-11. Drum Lock Phase Adjustment 9-6
9-12. Switching Position Adjustment 9-7

10. AUDIO SYSTEM ALIGNMENT

10-1. Alignment Tape PB Frequency Response Adjustment ... 10-2
10-2. Alignment Tape PB Level Adjustment ... 10-2
10-3. Alignment Tape PB Line Out Level Adjustment ... 10-3
10-4. PB Dolby DC Balance Adjustment ... 10-3
10-5. PB Dolby Detect Level Adjustment ... 10-3
10-6. PB Pilot Tone Phase Adjustment ... 10-4
10-7. PB Frequency Response Adjustment ... 10-4

11. VIDEO SYSTEM ALIGNMENT

11-1. PB RF Adjustment ... 11-2
  11-1-1. PB Pre-Amplifier Frequency Adjustment ... 11-2
  11-1-2. PB RF Frequency Response Adjustment (Middle) ... 11-3
  11-1-3. PB Y RF Channel Balance/Level Adjustment ... 11-3
  11-1-4. PB Chroma RF Channel Balance/Level Adjustment ... 11-4
11-2. Dropout Compensator Sensitivity Adjustment ... 11-4
11-3. Carrier Balance Adjustment ... 11-5
11-4. SP Mode Detector Circuit Adjustment ... 11-5
11-5. PB Y Phase Equalize Pre-Adjustment (SP and High modes) ... 11-6
11-6. PB Y Phase Equalize Pre-Adjustment (Low mode) ... 11-6
11-7. DUB Y Output Level Adjustment ... 11-7
11-8. Dropout Compensator Circuit DC Balance Adjustment ... 11-7
11-9. SP/Conventional Editing Point DC Adjustment ... 11-8
11-10. Y Noise Canceller Adjustment ... 11-9
11-11. PB Y Phase Equalizer Adjustment (SP and High modes) ... 11-11
11-12. PB Y Phase Equalizer Adjustment (Low mode) ... 11-11
11-13. Y Output Level Adjustment ... 11-12
11-14. False VD Pulse Width Adjustment ... 11-12
11-15. Chroma System Adjustment ... 11-13
  11-15-1. T/C Mute Pulse Width Adjustment ... 11-13
  11-15-2. Chroma Input Level Adjustment ... 11-13
  11-15-3. PB REF OSC Adjustment ... 11-13
  11-15-4. VCO DC Level Adjustment ... 11-14
  11-15-5. 5.3 MHz OSC Level Adjustment ... 11-14
  11-15-6. ACC Burst Gate Width/Phase Adjustment ... 11-15
  11-15-7. APC Burst Gate Width/Pharse Adjustmet ... 11-15
  11-15-8. APC Burst Gate Level Adjustment ... 11-16
  11-15-9. PB ACC Level Adjustment (High-band mode) ... 11-16
  11-15-10. PB ACC Level Adjustment (SP mode) ... 11-16
  11-15-11. PB ACC Level Adjustment (Low-band mode) ... 11-17
  11-15-12. TBC Mode APC Adjustment ... 11-17
  11-15-13. Pilot Burst Mute Pulse Adjustment ... 11-18
  11-15-14. Converter Balance Adjustment ... 11-18
  11-15-15. DG Compensator Pre-Adjustment ... 11-19
  11-15-16. Y/C Mix Adjustment ... 11-19
  11-15-17. DUB Chroma Output Level Adjustmet ... 11-20
  11-15-18. Pilot Burst Adjustment ... 11-20
11-16. PB Y/C Delay Adjustment ... 11-20
  11-16-1. PB Y/C Delay Adjustment (SP mode) ... 11-20
  11-16-2. PB Y/C Delay Adjustment (High-band mode) ... 11-21
  11-16-3. PB Y/C Delay Adjustment (Low-band mode) ... 11-21
  11-16-4. DUB Y/C Delay Adjustment (SP mode) ... 11-22

VOL-2

12. BLOCK DIAGRAM

13. SEMICONDUCTOR ELECTRODES

14. PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

15. SPARE PARTS AND FIXTURE

SECTION 1
GENERAL DESCRIPTION

1-1. FEATURES

High-quality picture with a new playback system
Playback using the newly developed SP (Superior Performance) system and SP tapes specially designed for the SP system, provide clearer and sharper pictures than before.

Three mode playback
The VP-9000P is capable of playback in the modes of SP, high-band and low-band.

Hi-Fi sound
Dolby NR C type noise reduction system permits high-performance audio playback with reduced noise (When playing back tapes recorded with Dolby NR on. S/N 70dB can be obtained with KSP or KSP-S tape). Cannon 3-pin connectors usually used for professional audio equipment are employed for the audio outputs.

Remote control using 33-pin connector
The VP-9000P is equipped with the 33-pin remote control connector, and can be controlled with an optional remote control unit such as the RM-500, RM-580. Any point can be searched for and be played back automatically usning an RX-353CE or RX-303CE auto search control unit.

Dubbing connectors for high quality picture duplication
The DUB OUT connector allows to duplicate the picture with minimum picture quality deterioration.

RS-232C interface
A simple circuit board replacement provides an RS-232C interface, which permits remote control operations from an optional auto search control unit, such as the Sony RX-707, or a computing device with an RS-232C interface capability.

Search operation
Governed by the search dial, playback pictures can be viewed at various speeds from 1/30 times to 5 times normal speed as well as in a still mode. As the playback can be performed in both forward and reverse directions, any desired scene can be easily found.

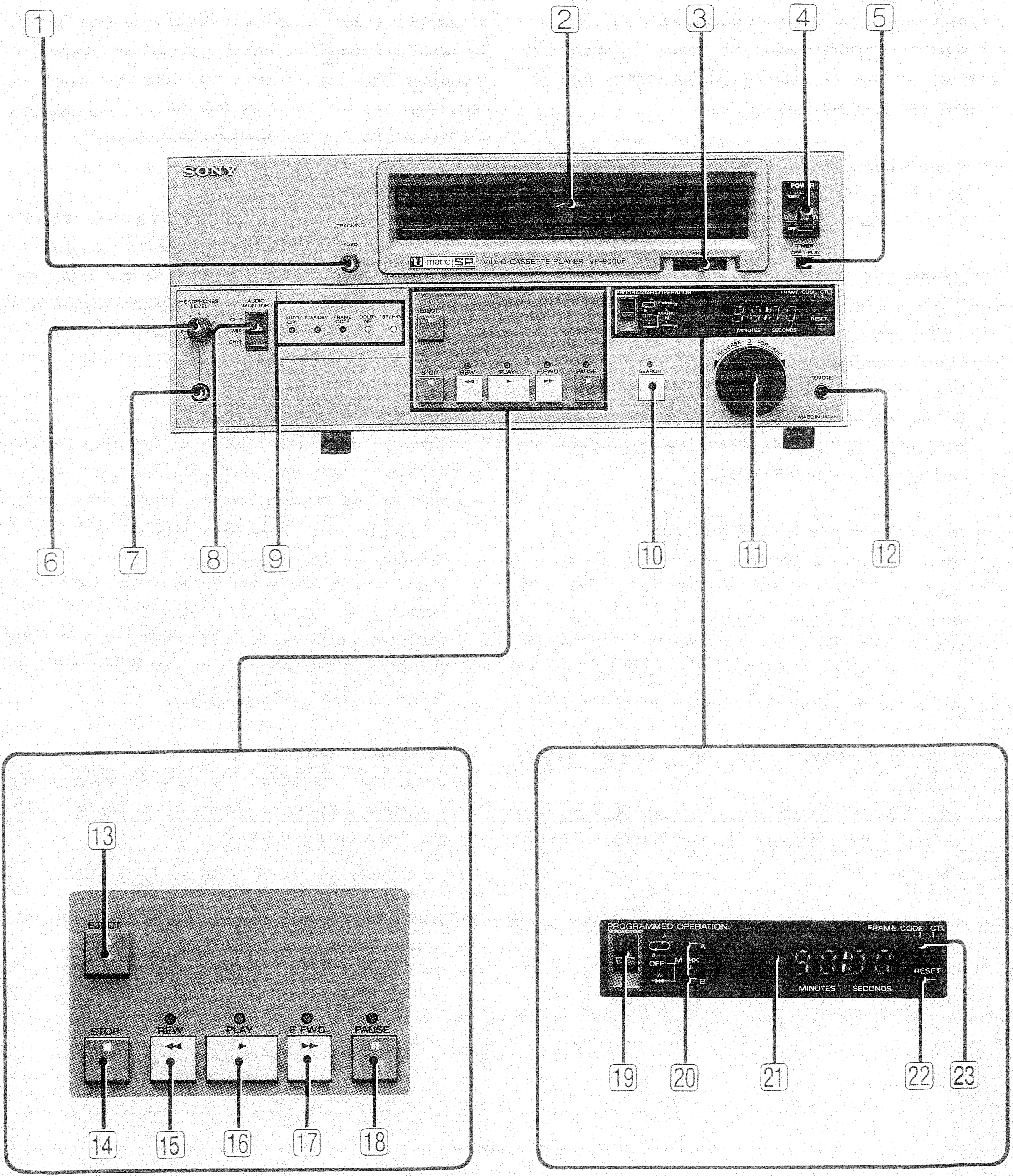
LED time counter
The time counter reads out the CTL signals recorded on a tape and the LEDs indicate the tape running time in seconds and minutes. These are useful to check the recording time of a material and the remaining time of a tape.
When a tape on which frame codes have been recorded is played with an optional BKU-701 computer interface board attached to this unit, the time counter shows the current tape position in frame codes (absolute address).

Programmed operation
Programmed operation allows you to easily locate a desired point on a tape and also to repeatedly play back a desired portion.

Connection of a time base corrector
The best possible playback picture will be obtained by connecting a time base corrector.

1-2. LOCATION OF PARTS AND CONTROLS

FRONT PANEL


1
2
3
4
5
SONY
TRACKING
FIXED
U-matic SP VIDEO CASSETTE PLAYER VP-9000P
POWER
TIMER
OFF PLAY
HEADPHONES LEVEL
AUDIO MONITOR
CH-1
MIX
CH-2
AUTO OFF
STANDBY
FRAME CODE
DOLBY NR
SP/HIGH
EJECT
STOP
REW
PLAY
F FWD
PAUSE
SEARCH
PROGRAMMED OPERATION
FRAME CODE CTL
MARK IN
RESET
MINUTES SECONDS
REVERSE
FORWARD
REMOTE
MADE IN JAPAN
6
7
8
9
10
11
12
13
EJECT
STOP
REW
PLAY
F FWD
PAUSE
14
15
16
17
18
PROGRAMMED OPERATION
FRAME CODE CTL
A
B
OFF
MARK
RESET
MINUTES
SECONDS
19
20
21
22
23

1 **TRACKING control**
Normally set this control at the center FIXED position. Should noise, snow or streaks appear in a playback picture, turn this control so that the best possible picture is obtained.

2 **Cassette compartment**

3 **SKEW lever**
Normally set this lever at the center position.
When "hooking" distortion appears in the upper part of a playback picture, slide this lever to the right or left to obtain a normal picture.

4 **POWER switch**

5 **TIMER switch**
For automatic playback using an optional timer.
Set this switch to OFF when no timer is used.

6 **HEADPHONES LEVEL control**

7 **HEADPHONES connector (stereo phone jack)**

8 **AUDIO MONITOR switch**
Select the sound to be monitored through headphones or a speaker of a video monitor.

9 **Indicator section**

AUTO OFF	Lights at power-on when moisture is condensed inside the unit. While this indicator is lit, any cassette cannot be loaded.
STANDBY	Lights while a tape is being threaded from or unthreaded to the cassette inside the unit.
FRAME CODE	Lights when a tape on which frame codes have been recorded is played back with a BKU-701 attached to this unit.
DOLBY NR*	Lights when a tape recorded with the Dolby NR system is played back.
SP/HIGH**	Lights when a tape recorded in SP or high-band mode is played back.

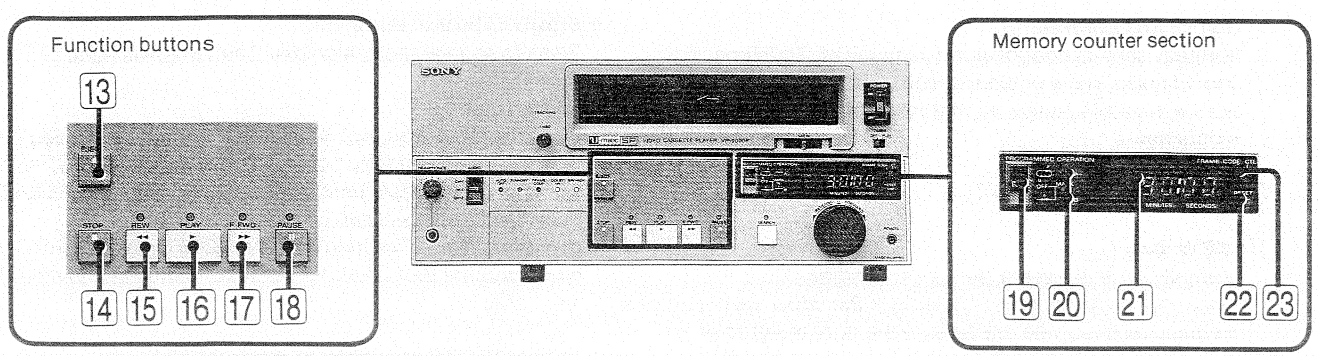
* When the power is turned on, the DOLBY NR lamp lights up even if no cassette has been inserted.

** When the power is turned on, the SP lamp lights up even if no cassette has been inserted.

10 **SEARCH button/lamp**
Press to engage the search dial. The lamp will light.

11 **Search dial**
By turning this dial with the SEARCH button depressed, the playback speed can be varied from $^1/_{30}$ to 5 ($^1/_{30}$, $^1/_{10}$, $^1/_5$, $^1/_2$, 1, 2, and 5) times normal speed. Clockwise rotation (to FORWARD) makes the tape run forwards and counterclockwise rotation (to REVERSE) makes it run backwards. At the center "0" position, the picture will be still.

12 **REMOTE connector**(special minijack)
Accepts an optional RM-690 remote control unit.
Playback, fast forward, rewind and search (with 5 times speed) operations can be remotely controlled.


Function buttons
13
EJECT
STOP
REW
PLAY
F FWD
PAUSE
14
15
16
17
18
SONY
Memory counter section
PROGRAMMED OPERATION
FRAME CODE CTL
MINUTES
SECONDS
19
20
21
22
23

Function buttons

13 EJECT ⏏ button

14 STOP ■ button

15 REW ◀◀ (rewind) button/lamp

16 PLAY ▶ (playback) button/lamp

17 F FWD ▶▶ (fast forward) button/lamp

18 PAUSE ❚❚ button/lamp

Memory counter section

19 PROGRAMMED OPERATION switch

A ↻ B	For repeatedly playing a particular portion or for checking the point memorized by the MARK IN A and B buttons.
OFF	For normal operation without using any programmed operation. (When the unit is to be controlled from a remote control unit connected to the REMOTE connector, be sure to set this switch to OFF.) Or for memorizing points on the MARK IN A and B buttons for a programmed operation.
A →|←	For locating a point memorized with the MARK IN A button. • If no point is memorized, the tape stops at the point indicated by "0" on the time counter.

20 MARK IN A and B buttons
Press to memorize the time counter value at that point. You can memorize only one point on each button. If the button is pressed several times, only the last point will be memorized.

> When a tape on which frame codes have been recorded is used with an optional BKU-701 attached to this unit, two kinds of data, one CTL and one frame code, can be memorized on each button by changing the FRAME CODE/CTL switch setting.

22 RESET button

This button has the following three functions.

Clearing the time counter indication

The time counter indication will be set to "0" when this button is pressed.

> When a BKU-701 is attached, the time counter indication will be set to "0" when this button is pressed with the FRAME CODE/CTL switch set at CTL.

Clearing the memories on the MARK IN A and B buttons

When the PROGRAMMED OPERATION switch is set at OFF or →|← , the points memorized by the MARK IN A and B buttons will be cleared and "0" will be memorized on both buttons, when the RESET button is pressed.

> When the BKU-701 is attached, perform this operation after setting the FRAME CODE/CTL switch to CTL.

Displaying the rotation time of the head drum

When this button is kept pressed for more than 2 seconds with the PROGRAMMED OPERATION switch set at ⇄, the duration of the head drum rotation will be indicated in fifties of hours on the time counter.

21 Time counter

23 FRAME CODE/CTL switch

Selects the time counter indication. See below.

When no BKU-701 is attached

FRAME CODE/CTL switch setting	Time counter indication
CTL	Tape running time in seconds and minutes (Relative address indication)
FRAME CODE	

When a BKU-701 is attached

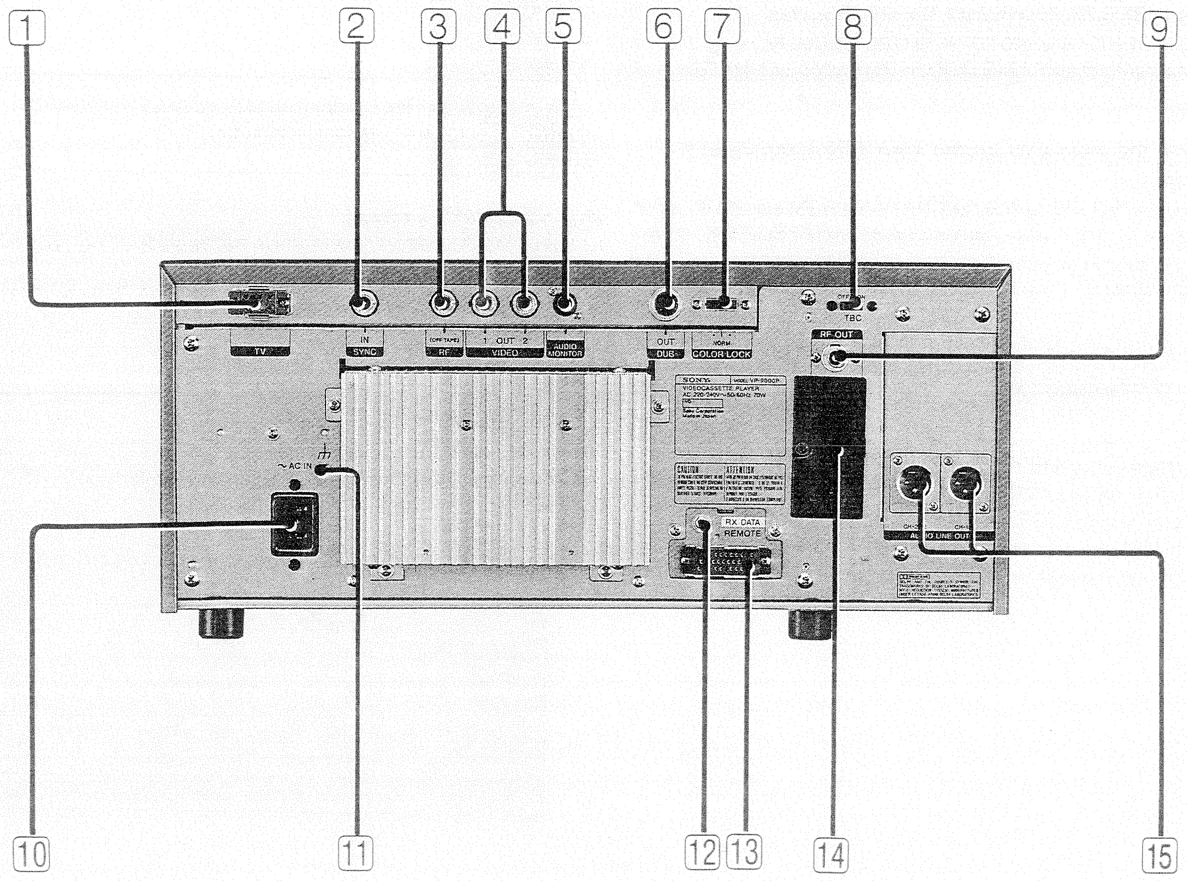
In playback of the video signal in which frame codes have been inserted

FRAME CODE/CTL switch setting	Time counter indication
FRAME CODE	Frame code numbers (Absolute address indication)
CTL	Tape running time in seconds and minutes (Relative address indication)

In playback of the video signal in which no frame code has been inserted

FRAME CODE/CTL switch setting	Time counter indication
FRAME CODE	Frame numbers obtained by counting and converting the CTL signals
CTL	Tape running time in seconds and minutes

REAR PANEL


1
2
3
4
5
6
7
8
9
TV
IN
SYNC
(OFF TAPE)
RF
1 OUT 2
VIDEO
AUDIO
MONITOR
OUT
DUB
NORM
COLOR LOCK
OFF ON
TBC
RF OUT
SONY
VIDEOCASSETTE PLAYER
CAUTION
ATTENTION
~AC IN
RX DATA
REMOTE
CH-2
CH-1
AUDIO LINE OUT
10
11
12
13
14
15

1 TV (monitor) connector (8-pin connector)

Accepts a video monitor having an 8-pin VTR connector. Both the VIDEO OUT, and AUDIO LINE OUT connections can be replaced with a single cable connection here. The audio channel selected by the AUDIO MONITOR switch will be heard through the speaker on the video monitor.

2 SYNC IN (sync signal input) connector (BNC type)

Accepts an external sync signal to operate the unit in synchronization with an external device (time base corrector, etc.).

3 RF (OFF TAPE) output connector (BNC type)

Supplies an FM signal to a time base corrector in playback.

4 VIDEO OUT 1 and 2 connectors (BNC type)

5 AUDIO MONITOR output connector (phono jack)

Supplies an audio signal selected at the AUDIO MONITOR switch on the front panel.

6 DUB OUT connector (7 pin)

When duplicating a tape using a recorder with a dubbing connector, the video signal is connected using this connector.

7 COLOR LOCK switch

As a rule, set to NORMAL. If the playback picture has no color or if the hue is abnormal, set the switch to the upper or lower position marked [•].

8 TBC (time base corrector) switch

ON	For playback using a time base corrector.
OFF	For playback without using a time base corrector.

9 RF OUT connector (DIN type)

Feeds out video and audio signals as a modulated TV signal. Connect it to the antenna terminal of a TV receiver.

10 AC IN connector

11 Ground terminal

12 RX DATA connector (minijack)

For recording data or reading recorded data by an RX-353CE or RX-303CE auto search control unit.

13 REMOTE connector (33-pin)

Connect an optional editing control unit, auto search control unit, or remote control unit to remotely control the player.

- Before connecting a remote control cable, check whether the connector is male or female.
- A 20-pin connector can also be connected without using any plug adaptor.

14 RF modulator compartment

Insert an optional RF modulator here to monitor playback picture and sound on a TV receiver. (A compartment cover is supplied with this unit.)

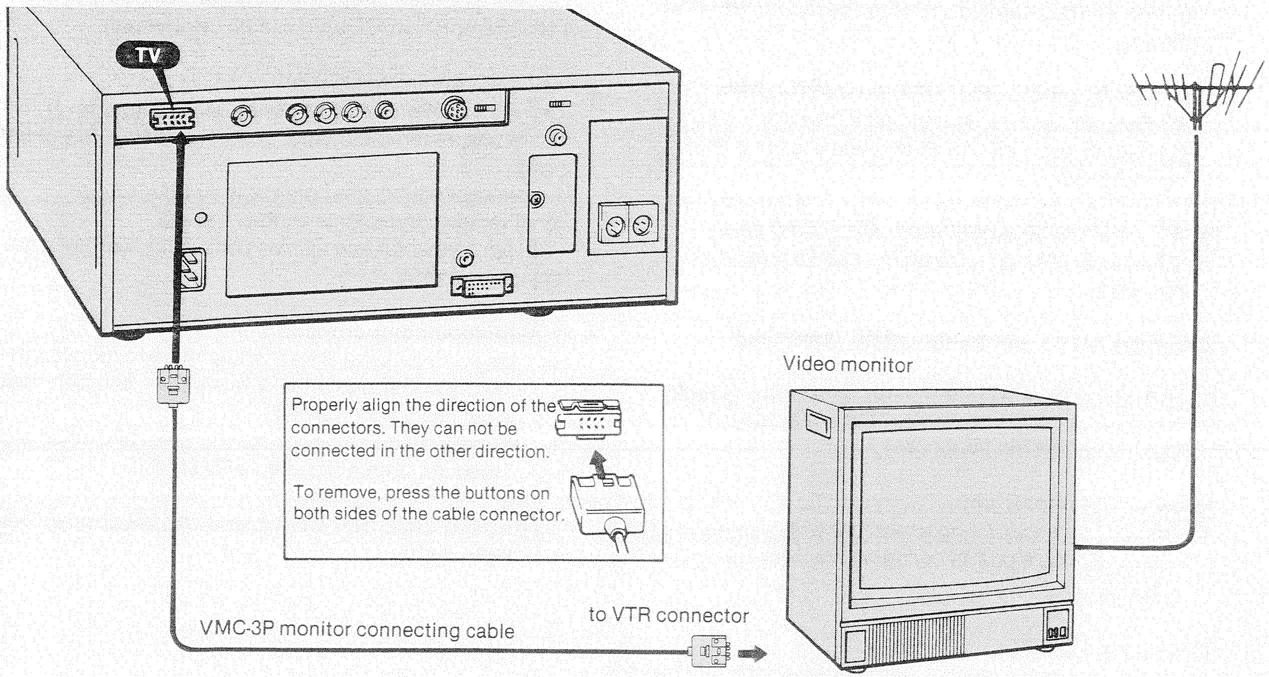
- An RF modulator converts the video and audio signals read out from a tape into a TV signal.

15 AUDIO LINE OUT CH-1/L and CH-2/R connectors (XLR 3-pin male)

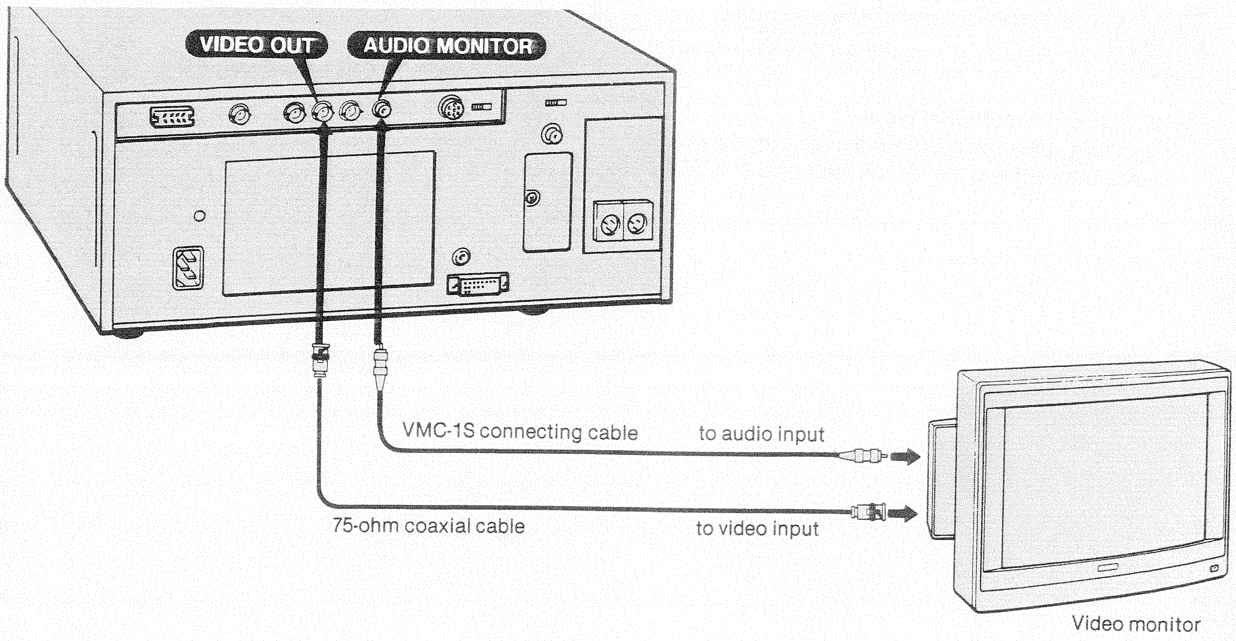
1-3. CONNECTION

1-3-1. Connection to a Video Monitor

FOR CONNECTING A VIDEO MONITOR WITH AN 8-PIN VTR CONNECTOR

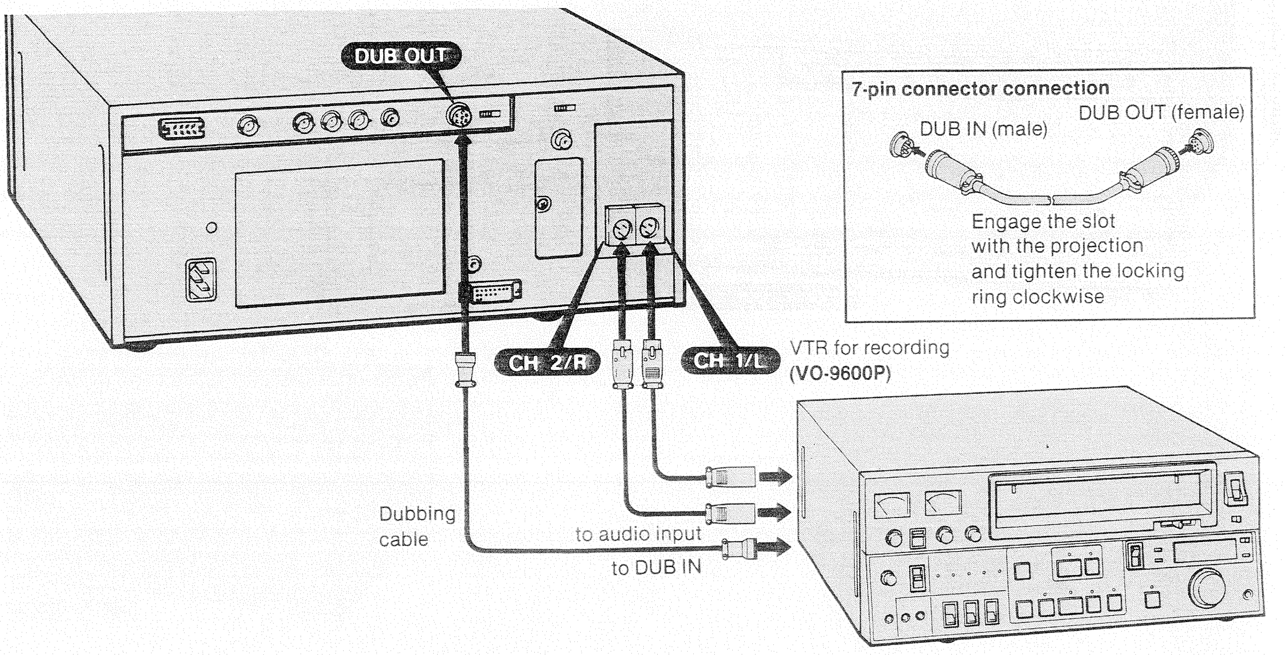

TV
Video monitor
Properly align the direction of the connectors. They can not be connected in the other direction.
To remove, press the buttons on both sides of the cable connector.
VMC-3P monitor connecting cable
to VTR connector

FOR CONNECTING A VIDEO MONITOR NOT HAVING AN 8-PIN VTR CONNECTOR

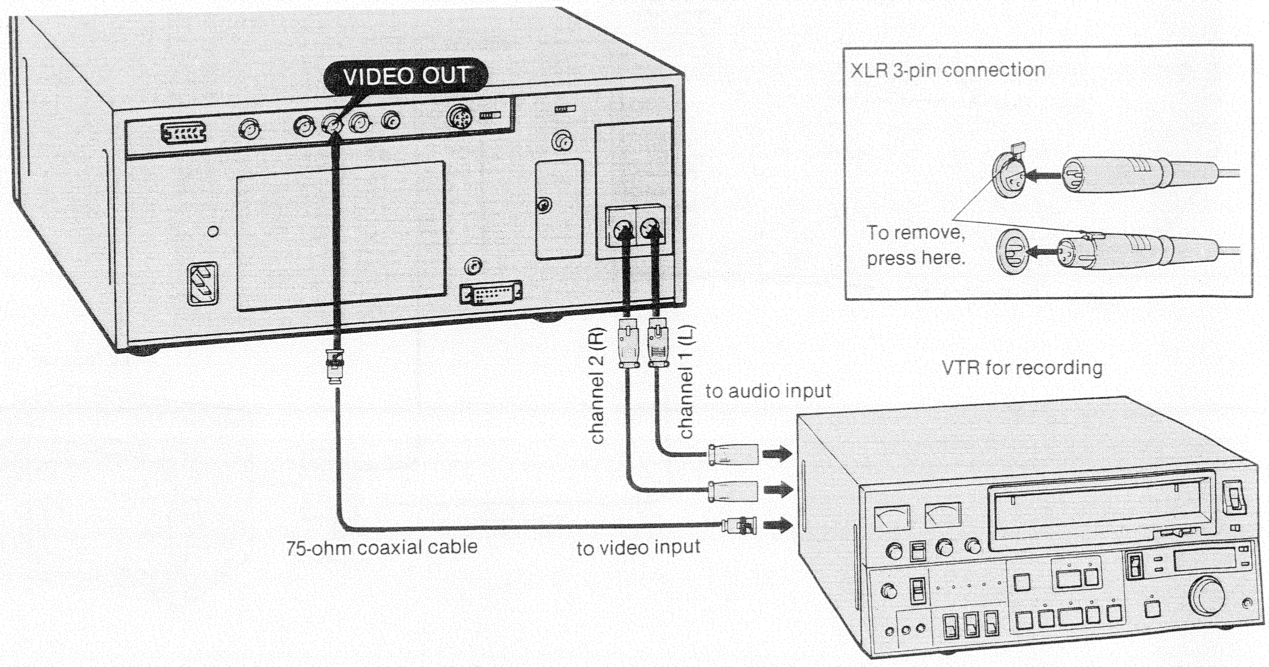

VIDEO OUT
AUDIO MONITOR
VMC-1S connecting cable
to audio input
75-ohm coaxial cable
to video input
Video monitor

1-3-2. Connection to a VTR

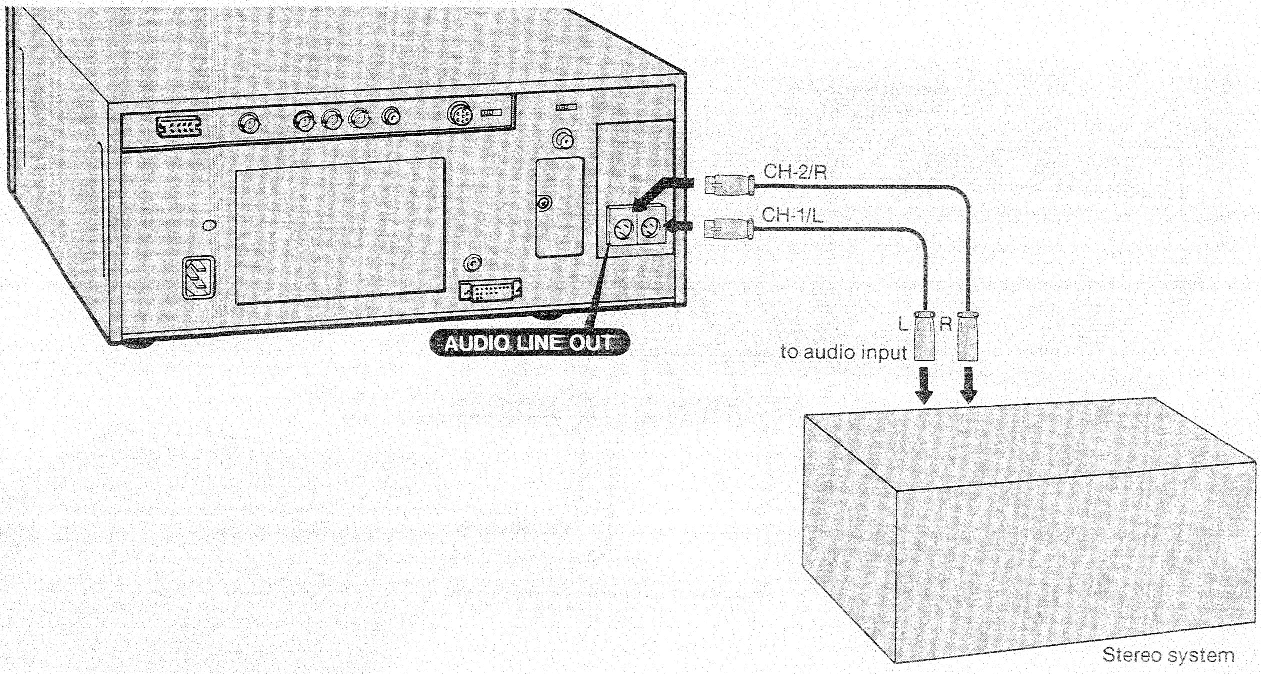
FOR TAPE DUBBING WHEN THE RECORDER HAS A DUB CONNECTOR


DUB OUT
7-pin connector connection
DUB OUT (female)
DUB IN (male)
Engage the slot with the projection and tighten the locking ring clockwise
CH 2/R
CH 1/L
VTR for recording
(VO-9600P)
Dubbing cable
to audio input
to DUB IN

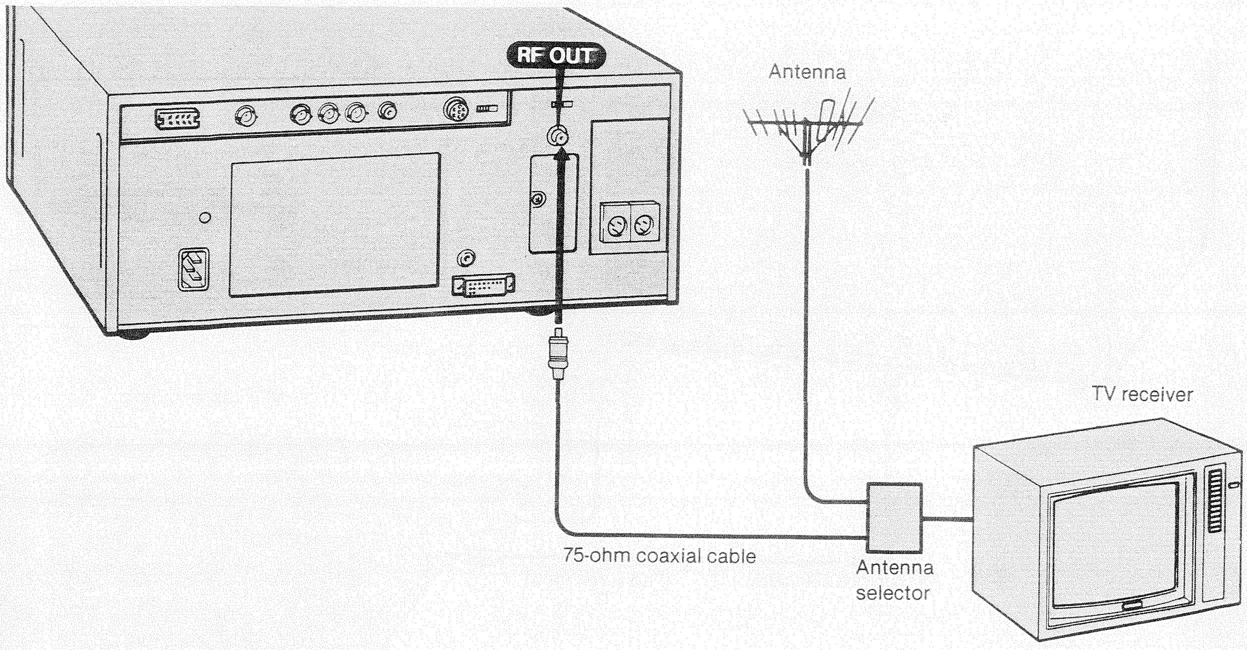
FOR TAPE DUBBING WHEN THE RECORDER HAS NO DUB CONNECTOR


VIDEO OUT
XLR 3-pin connection
To remove, press here.
channel 2 (R)
channel 1 (L)
to audio input
VTR for recording
75-ohm coaxial cable
to video input

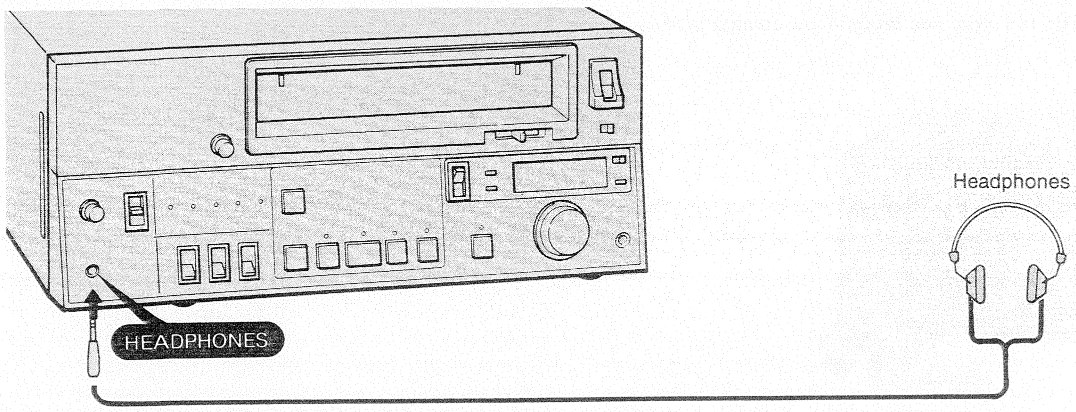
1-3-3. Connection to a Stereo System


CH-2/R
CH-1/L
AUDIO LINE OUT
L
R
to audio input
Stereo system

1-3-4. Connection to a TV Receiver


RF OUT
Antenna
TV receiver
75-ohm coaxial cable
Antenna selector

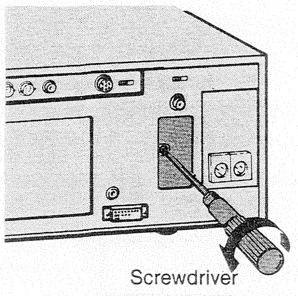
1-3-5. Connection to Headphones


Headphones
HEADPHONES

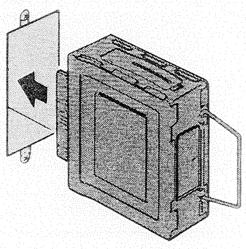
1-4. TO VIEW A PICTURE ON A TV RECEIVER

1-4-1. Installing the RF Modulator

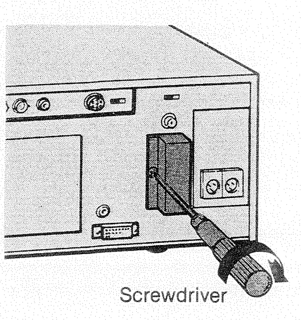
1 Remove the lid of the RF modulator compartment.



2 Install the modulator into the compartment aligning the direction properly.



3 Attach the supplied compartment cover with the original screws.



1-4-2. Connection to a Color TV Receiver

1 Set the ANT/VTR switch on the antenna selector to VTR.

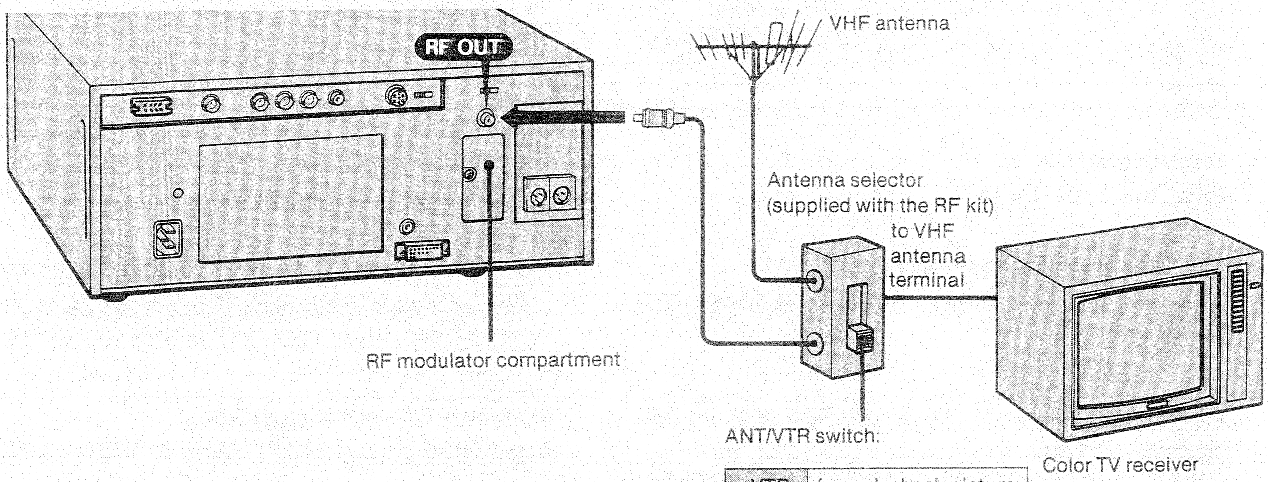
2 Turn on the TV receiver, and select the channel for VTR (the same channel with the output channel of the RF modulator).

3 Turn on the recorder.

4 Insert a recorded cassette.

5 Select the desired audio channel with the AUDIO MONITOR switch.

6 Press the PLAY button. You can see a playback picture on a TV screen.


RF OUT
VHF antenna
Antenna selector
(supplied with the RF kit)
to VHF antenna terminal
RF modulator compartment
ANT/VTR switch:
Color TV receiver

VTR	for a playback picture
ANT	for a TV program

1-5. OPERATION

To stop the tape momentarily
Press the PAUSE button. The tape stops and a still picture appears on the monitor screen. The still picture is a clear one having no guardband noise.
To resume recording, press the PAUSE button again or press the PLAY button.

Long pause mode
If the pause mode continues for more than 8 minutes, the tape around the head drum automatically slackens to protect the video head and the tape. This is called "long pause mode". To release the long pause mode, press the PAUSE button.

To stop playback
Press the STOP button.

When the tape is played back to the end
It automatically rewinds to the beginning and then stops.

If the tape does not run by pressing any of the function buttons

1. Press the EJECT button and take out the cassette.
2. Turn the reel to the direction of the arrow on the bottom of the cassette until the leader tape is completely taken up.
3. Insert the cassette again.

Search operation
A desired portion can be quickly located with the search dial.

1. Press the SEARCH button.
   The lamp lights.
2. Turn the search dial towards;
   FORWARD (right): to play in the normal direction
   REVERSE (left): to play in the reversed direction
   The playback speed varies from 1/30, 1/10, 1/5, 1/2, 1, 2 to 5 times normal speeds according to the dial rotation angle.
3. Set the dial to the center "0" position at the desired point.
   The tape stops in pause mode and a still picture can be seen on the monitor screen.

NOTE:

- Guardband noise may flow on the playback picture with a speed other than the normal speed as the servo system is not locked during search operation.
- If the TBC switch is set to ON with no time base corrector connected, the picture does not lock in the search mode and it may roll vertically.

To release the search operation
Press either of the PLAY, REW, F FWD or STOP button.

To stop the repeat playback
Press the STOP button.

Note on repeat playback
When the repeat playback continues for a long period of time using the CTL signal, the playing portion may be shifted a little. Precise repeat playback can be obtained when a tape on which frame codes have been recorded is used and the BKU-701 is installed.

When the programmed operation is finished

Be sure to return the PROGRAMMED OPERATION switch to OFF.

To check the memorized points

1 Press the STOP button to stop the tape.

2 Set the PROGRAMMED OPERATION switch to $\overset{A}{\underset{B}{\circlearrowleft}}$.

3 Press either the MARK IN A or B button.
The memory on that button will be displayed on the time counter.

To display the time between two particular points designated for a repeat playback

1 Stop the tape with the STOP button.

2 Set the PROGRAMMED OPERATION switch to $\overset{A}{\underset{B}{\circlearrowleft}}$.

3 Press the MARK IN A and B buttons simultaneously.
While the buttons are pressed, the time between the designated points will be displayed on the time counter.

Memory back up function

The last memories on the MARK IN A and B buttons and the last time counter display will be maintained due to the built-in Lithium battery even if the power is turned off. The battery provides approx. 3-year backup after the shipment. Should the memories be lost, the battery may have been exhausted.

To erase the memory

You can memorize only one point on each MARK IN A or B button. If the button is pressed several times, only the last point will be memorized.

When the RESET button is pressed with the PROGRAMMED OPERATION switch set at OFF or $\overset{A}{\rightarrow\mid\leftarrow}$, the memories are erased and the "00:00" point will be memorized on both buttons.

To locate a desired point

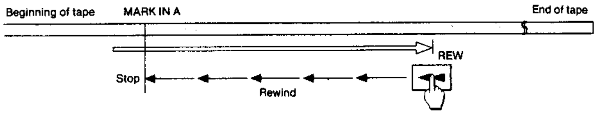
1 Set the PROGRAMMED OPERATION switch to OFF.

2 Play the tape and stop it at the desired point momentarily.

3 Press the MARK IN A button.
Resume the playback.

4 Set the PROGRAMMED OPERATION switch to $\overset{A}{\rightarrow\mid\leftarrow}$.

5 Press the REW button.
The tape will stop at the memorized point.



To repeat a desired portion

1 Set the PROGRAMMED OPERATION switch to OFF.

2 Play the tape and stop it momentarily at the point from which the playback is to be started.

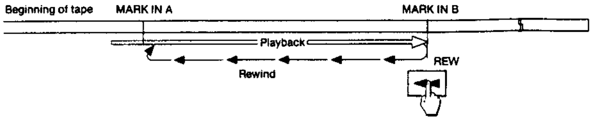
3 Press the MARK IN A button.

4 Search for a point where the playback is to be stopped and stop the tape momentarily at that point.

5 Press the MARK IN B button.

6 Set the PROGRAMMED OPERATION switch to $\overset{A}{\underset{B}{\circlearrowleft}}$.

7 Press the REW button.
The portion between the points memorized on the MARK IN A and B button is repeatedly played back.



To repeat between the beginning of a tape and a particular point

1 Set the PROGRAMMED OPERATION switch to OFF.

2 Search for a point where the playback is to be stopped and stop the tape momentarily at that point.

3 Press the MARK IN B button.

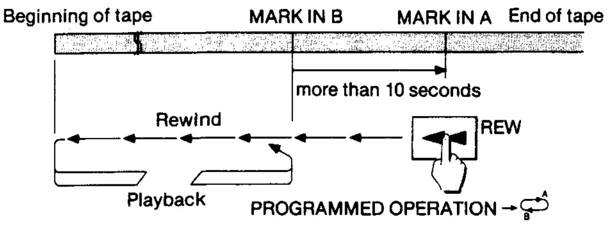
4 Press the PLAY button. After playing the tape for more than 10 seconds, stop the tape momentarily.

5 Press the MARK IN A button.

6 Set the PROGRAMMED OPERATION switch to ↻.

7 Press the REW button.

The tape rewinds to the beginning and the unit enters the playback mode. Then, the beginning of the tape to the point memorized on the MARK IN B button is repeatedly played back.


Beginning of tape
MARK IN B
MARK IN A
End of tape
more than 10 seconds
Rewind
REW
Playback
PROGRAMMED OPERATION → ↻

To repeat between a particular point and the end of the tape

1 Set the PROGRAMMED OPERATION switch to OFF.

2 Search for the point from which the playback is to begin and stop the tape momentarily at that point.

3 Press the MARK IN A button.

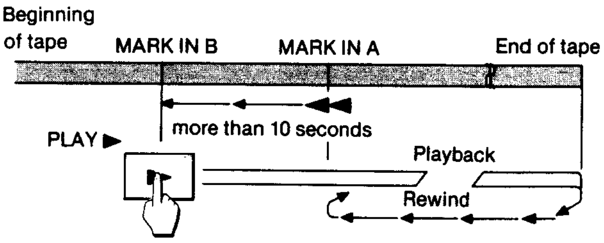
4 Press the REW button to rewind the tape for more than 10 seconds then stop the tape momentarily.

5 Press the MARK IN B button.

6 Set the PROGRAMMED OPERATION switch to ↻.

7 Press the PLAY button.

The tape is played back to the end and rewinds to the point memorized on the MARK IN A button, and the playback of the portion from that point to the end of the tape is repeated.


Beginning of tape
MARK IN B
MARK IN A
End of tape
PLAY ▶
more than 10 seconds
Playback
Rewind

SECTION 2
SERVICE INFORMATION

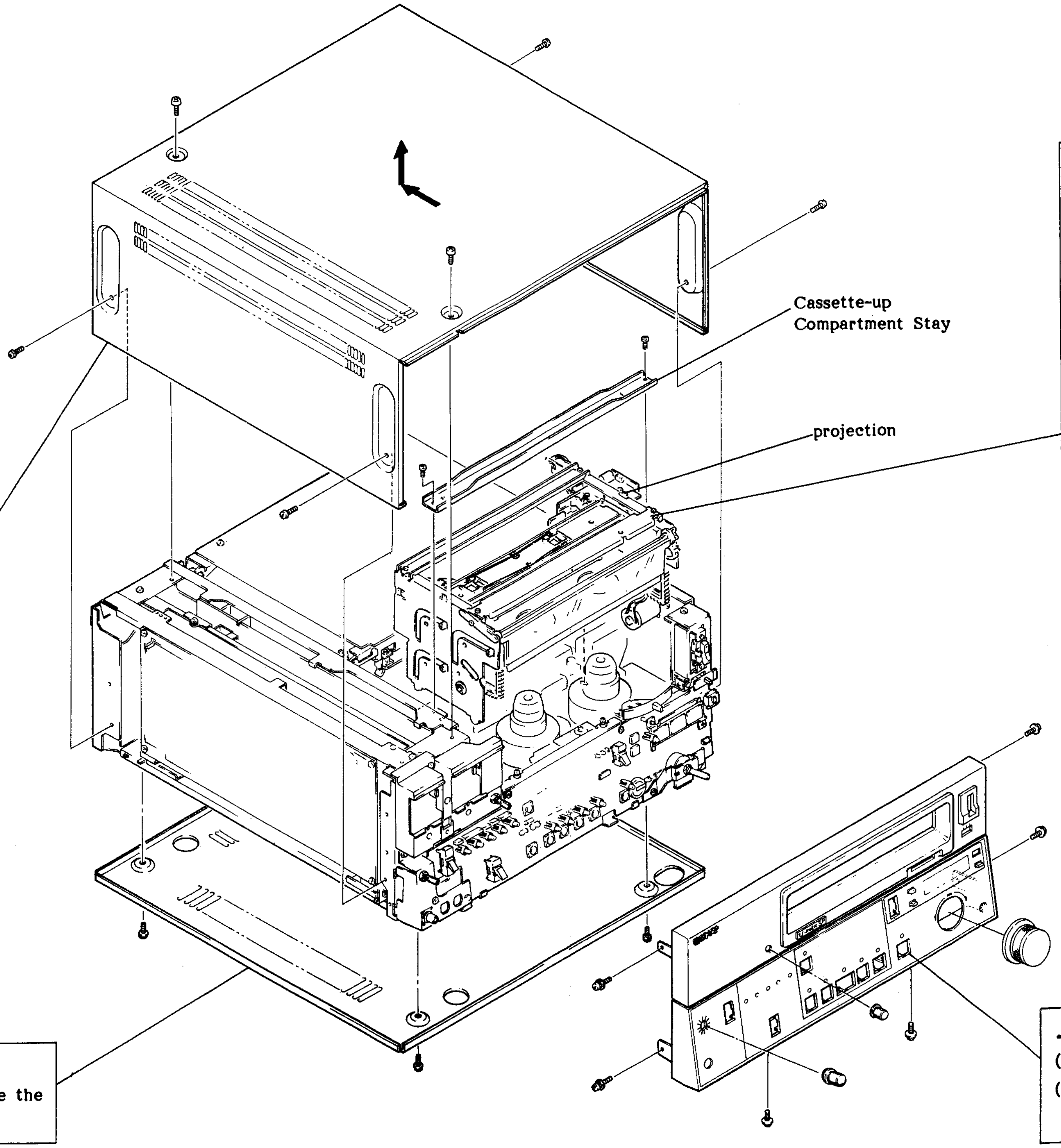
2-1. REMOVAL OF CABINET

. Upper Case

Remove the six fixing screws shown in the figure. Then remove the Upper Case from the unit in the direction of the arrow.

. Lower Case

Remove the four fixing screws. Then remove the Lower Case from the unit.



. Cassette-up Compartment

(1) Remove the Upper Case.
(2) Remove the two fixing screws and then remove the Cassette-up Compartment Stay.
(3) Disconnect CN1 on the CC-31 board.
(4) Lift the Cassette-up Compartment Block, insert the projections of the Cassette-up Compartment Block into the holes of the chassis.
(6) Connect CN1 on the CC-31 board.
(7) Insert the projections of the Cassette-up Compartment Block into the holes of the Cassette-up Compartment Stay (as shown in the figure) and then fix the screws.

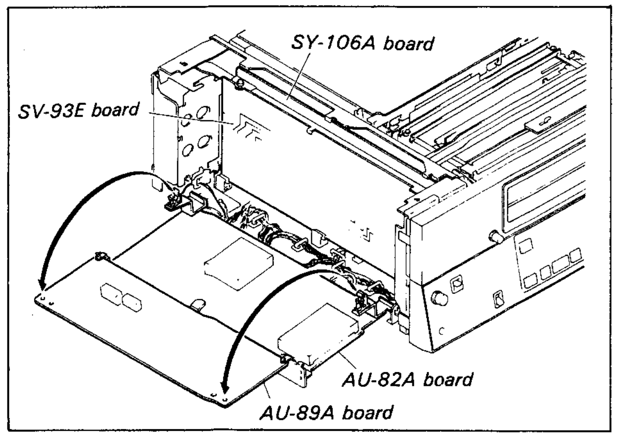
. Front Panel

(1) Remove the Upper Case.
(2) Remove the six fixing screws (two screws each on the left and right sides and the bottom).

2-2. HOW TO SERVICE THE PRINTED CIRCUIT BOARD

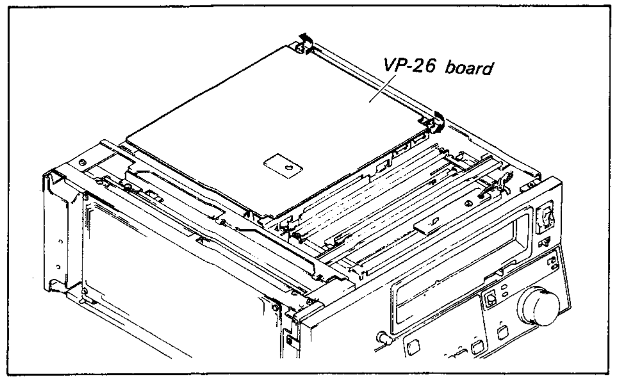
2-2-1. AU-82A, AU-89A, SV-93E and SY-106A Boards

Open the AU-82A and AU-89A boards to repair as shown in the figure.


SY-106A board
SV-93E board
AU-82A board
AU-89A board

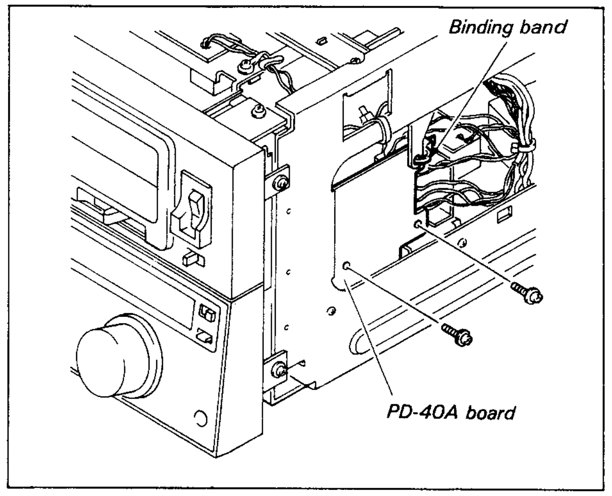
2-2-2. VP-26 Board

Turning the fastener to the direction of the arrow, the VP-26 board can be opened. Then, the component side of the VP-26 board can be repaired.



2-2-3. PD-40A Board

Cut a binding band and remove two screws, and then remove the PD-40A board.

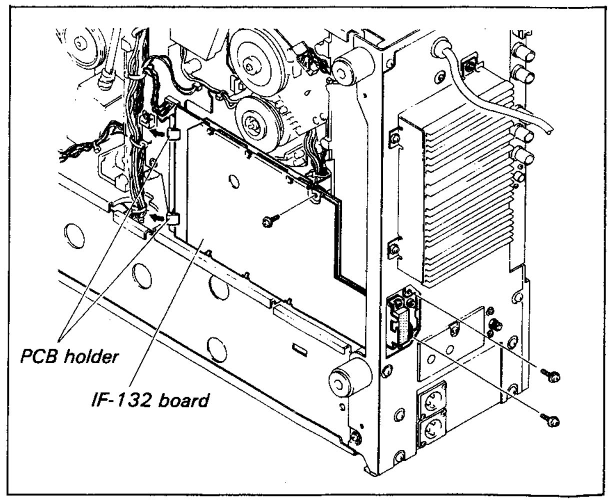

Binding band
PD-40A board

2-2-4. IF-132 Board

(1) Open the PCB holder in the direction of the arrow, and then open the IF-132 board.

(2) Remove a screw.

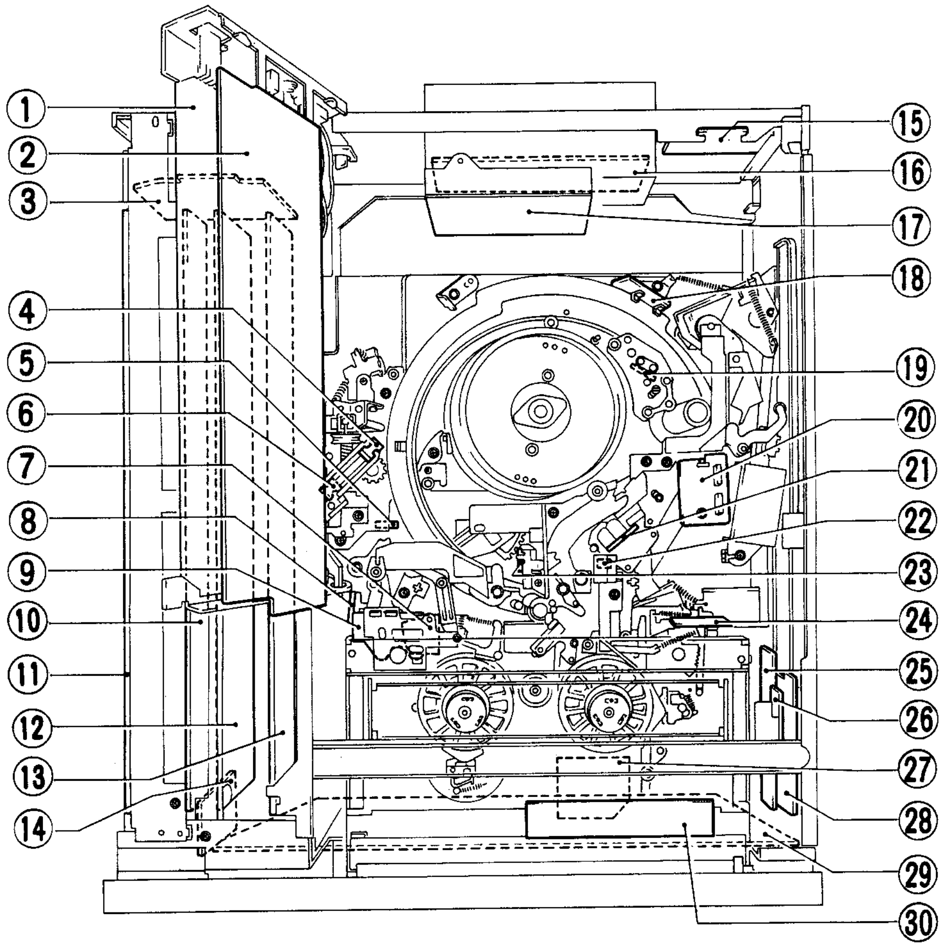
(3) Remove the two screws which install RX DATA terminal and REMOTE terminal.


PCB holder
IF-132 board

2-3. MAIN PARTS LOCATION

2-3-1. Location of the Printed Circuit Board

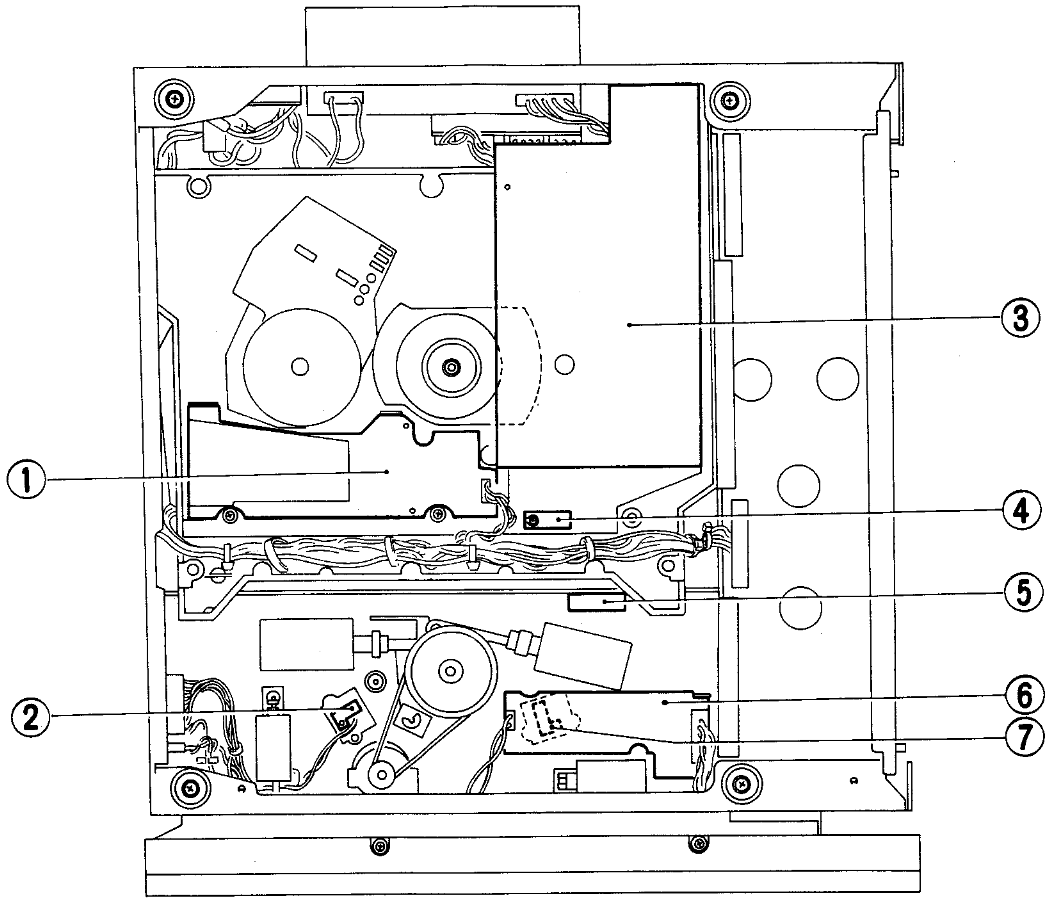
[TOP VIEW]



1 VP-26 Board
2 CO-7A Board
3 CP-112A Board
4 PH-5 Board
5 LM-13 Board
6 PH-5 Board
7 SE-46 Board
8 PTC-34 Board
9 PTC-30 Board
10 AU-89A Board
11 AU-82A Board
12 SV-93E Board
13 SY-106A Board
14 HP-30 Board

15 AC-89 Board
16 UR-14E Board
17 DC-31A Board
18 PTC-33 Board
19 DUS-92 Board
20 DUS-147 Board
21 EC-28 Board
22 PH-5 Board
23 PH-5 Board
24 CC-33 Board
25 CC-32 Board
26 CC-31 Board
27 RM-39 Board
28 PD-40A Board
29 KY-105E Board
30 LP-41 Board

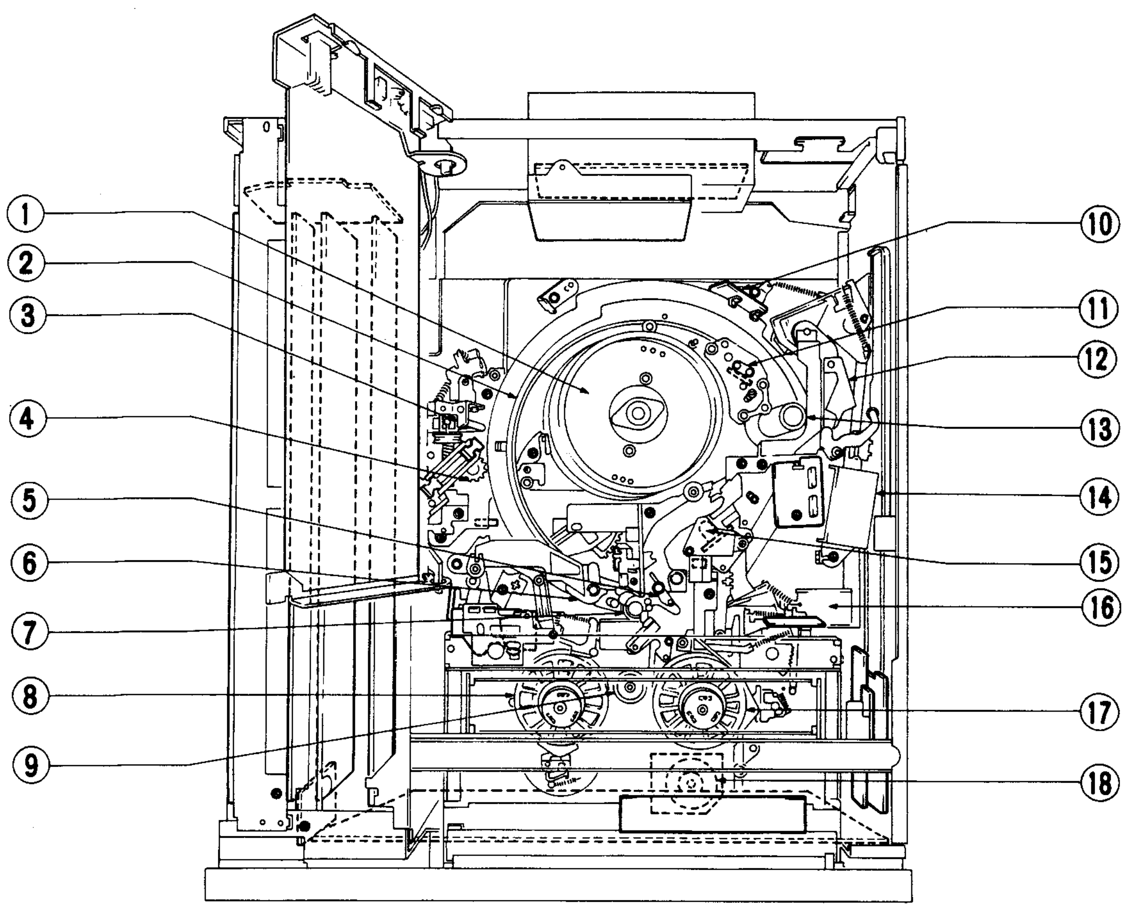
[BOTTOM VIEW]



1 RP-35A Board
2 PTC-35 Board
3 IF-132 Board
4 PT-9 Board
5 TG-22 Board
6 PD-41 Board
7 PTC-35 Board

2-3-2. Location of the Mechanical Main Parts/ Components

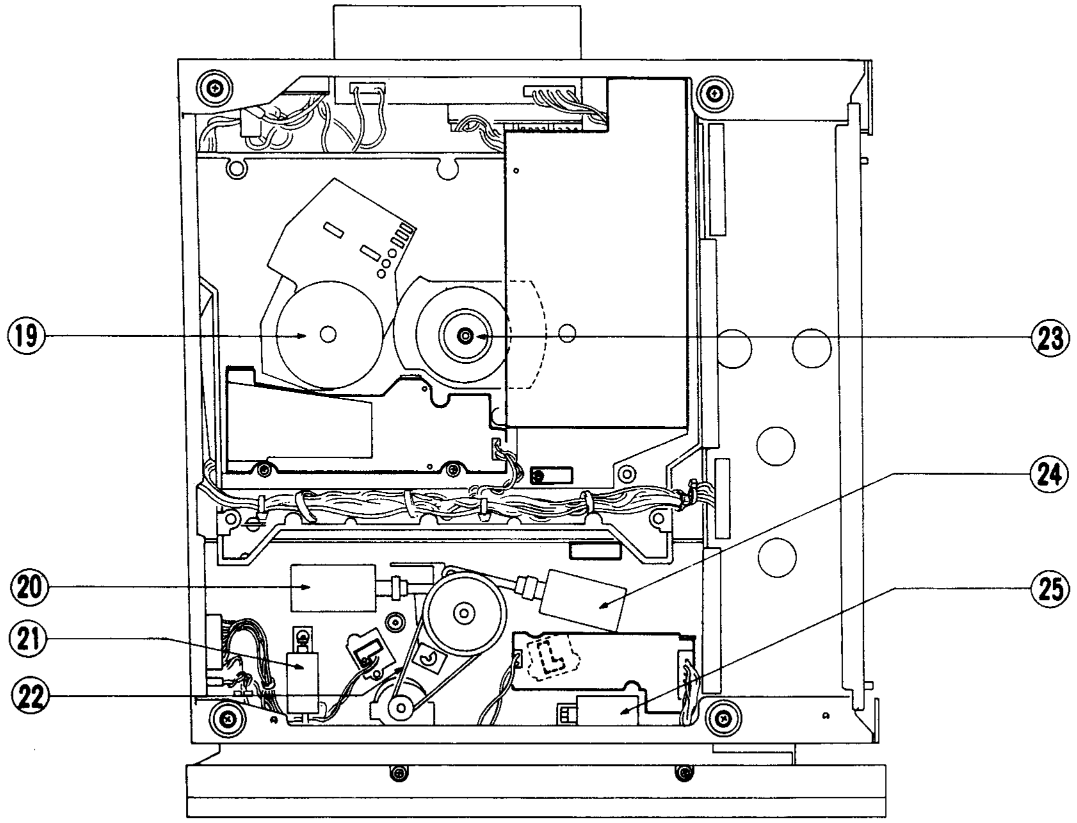
[TOP VIEW]



1 Head Drum
2 Threading Ring
3 T Correction Guide
4 Gear Box
5 S Drawer Arm
6 T Drawer Arm
7 Pinch Roller
8 Take-up Reel Table
9 FF/REW Idler

10 FR Detector
11 Audio/CTL Head
12 Pinch Lever
13 Capstan Shaft
14 Pinch Solenoid
15 CTL PB Head
16 Search Solenoid
17 Supply Reel Table
18 Reel Motor

[BOTTOM VIEW]



19 Capstan Motor
20 Supply Idler Solenoid
21 Supply Brake Solenoid
22 Belt for FF/REW Idler
23 Drum Motor
24 Take-up Idler Solenoid
25 Take-up Brake Solenoid

2-4. PRINTED CIRCUIT BOARD

Circuit information is provided below.

SYSTEM	BOARD	CIRCUIT FUNCTION
VIDEO	RP-35A	PB Amplifier
	VP-26	Y PB (Y/C Separator)
	CO-7A	Color PB
AUDIO	AU-82A	PB Amplifier
	AU-89A	Dolby
	CP-112A	Output Amplifier
	DUS-92	Audio CTL Head
	DUS-147	Audio CTL Head
	HP-30	Headphones
	MC-28	MIC In
	MT-29	Audio Level Meter
SERVO	EC-28	CTL Head
	DUS-92	Audio CTL Head
	DUS-147	Audio CTL Head
	PT-9	Reel Motor Driver
	SV-93E	Servo System
POWER	AC-89	AC Input
	DC-31A	DC Supply
	UR-14E	Switching Regulator
KEY	KY-105E	Function Key/Display
SYSTEM CONTROL	IF-132	33P Interface
	PD-40A	Plunger Solenoids
	PD-41	Plunger Solenoids
	PH-5	Tape Beginning/End Sensor
	SY-106A	System Control
OTHERS	CC-31	Cassette Compartment Driver
	CC-32	Cassette In Detector
	CC-33	Cassette Down Detector
	LM-13	Threading Motor
	LP-41	Cassette Compartment Light
OTHERS	PTC-30	SP, Miss REC. KCA Detector
	PTC-33	FR Stop Detector
	PTC-34	Unthreadend Detector
	PTC-35	S/T Reel Rotation Detector
	RM-39	Reel Motor
	SE-46	Tension Regulator Detector
	TG-22	Tension Regulator LED

2-5. CONNECTORS

When external cables are connected to the various connectors on the connector panel during maintenance, the hardware listed below (or equivalents) must be used.

Panel Indication	**Connector**
TV	1-506-161-00 CONNECTOR, 8P, MALE
SYNC IN RF VIDEO OUT 1,2	1-560-069-11 PLUG, BNC, MALE
AUDIO MONITOR	1-506-311-00 PLUG, PIN
RF OUT	1-508-459-00 CONNECTOR, AERIAL
AUDIO LINE OUT CH-1, CH-2	1-508-083-00 CONNECTOR, XLR, 3P, MALE
DUB OUT	1-508-948-00 PLUG, 7P, MALE

2-6. OUTPUT SIGNAL OF THE CONNECTOR

VIDEO OUT 1, 2 : 1.0 ± 0.2 Vp-p, 75 ohms, unbalanced, sync negative

AUDIO LINE OUT CH-1/L, CH-2/R : +4 dB (600-ohm load), balanced

AUDIO MONITOR : -5 dB (47-kohm load)

2-7. SPARE PARTS

(1) The shaded and ⚠ -marked components are critical to safety.
Replace only with the same components as specified.

(2) Replacement parts supplied from the Sony Parts Center will sometimes have a different shape and outside view from the parts which are used in the unit. This is due to "accommodating improved parts and/or engineering changes" or "standardization of genuine parts".
- This manual's exploded views and electrical spare parts lists indicate the part numbers of "the present standardized genuine parts".
- Regarding engineering part changes by our engineering department, refer to Sony service bulletins and service manual supplements.

(3) The parts marked with "s" in the SP column of the exploded views and electrical spare parts lists are normally stocked for replacement purposes. The parts marked with "o" in the SP column are not normally required for routine service work. Orders for parts marked with "o" will be processed, but allow for additional delivery time.

2-8. SELECT SWITCH SETTING

Along with the select switches on the control panel and the connector panel, the switch listed below is on the SY-106A board. This switch must be set according to operating conditions.

. SY-106A Board
SW1: SELF DIAGNOSTIC Switch
ON: SELF DIAGNOSTIC mode
OFF: NORMAL mode
When the unit is shipped, this switch is set to the OFF position.

2-9. HOW TO OPERATE THE MACHINE WITHOUT INSTALLING A CASSETTE TAPE

(1) Remove the Cassette-up Compartment. (Refer to Section 2-1.)
(The Tape Beginning Sensor and Tape End Sensor are disabled according to disconnect the connector of Cassette-up Compartment.)

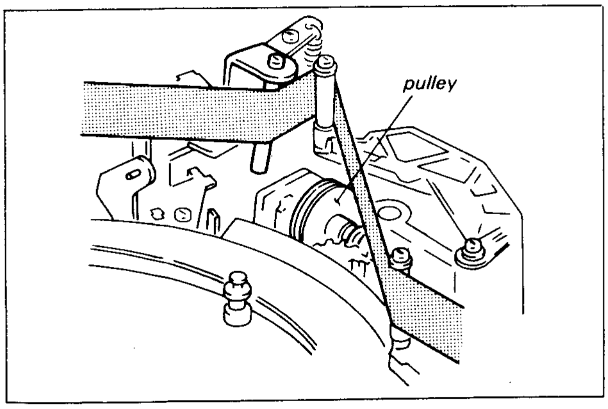
(2) Turn the power ON. (The machine enters the FR-STOP mode automatically.)

(3) The machine can be placed into the desired mode by pressing the function button corresponding to the mode.

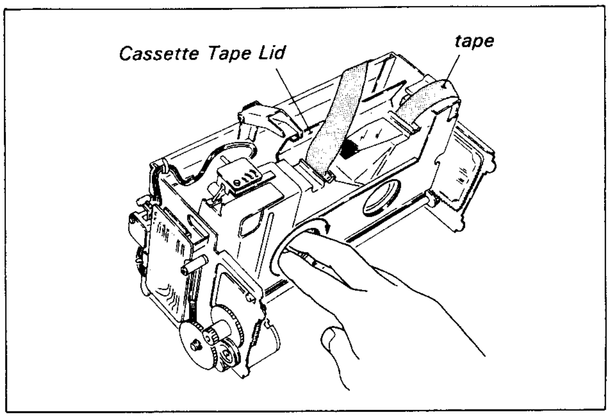
2-10. CASSETTE REMOVAL PROCEDURE WHEN NORMAL EJECTION IS NOT POSSIBLE

If the EJECT operation becomes impossible due to trouble or the Cassette-up Compartment does not rise when the EJECT operation takes place, the cassette tape can be removed from the set by following the procedures described below.

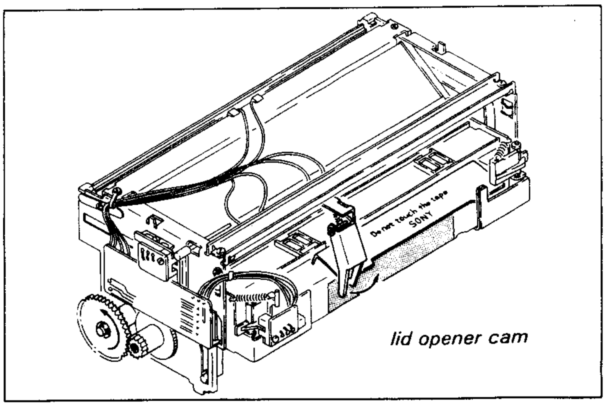
(1) Turn the power OFF.
(2) Remove the Upper Case. (Refer to Section 2-1.)
(3) Turn the white pulley of the Gear Box by hand in a clockwise direction looking from the front panel side until the Threading Ring is in the FR-STOP position (until the S Drawer Arm is located at the front of CTL head). (At this time, the Threading Ring moves in the unthreading direction. But the tape remains at the position of threading completion.)



(4) Disconnect the connector CN1 on the CC-31 board of the Cassette-up Compartment.
(5) Remove the Cassette-up Compartment Stay. (Refer to Section 2-1.)
(6) Slowly lift the Cassette-up Compartment with the cassette tape in it. Remove the tape remaining in the set carefully so that it is not damaged.
(7) Hold the Cassette Tape Lid so that it does not close. Wind the tape into the cassette by turning the reel hub on the back of the cassette by hand.



(8) Raise the cam for opening the lid and close the cassette lid.



(9) Remove the tape from the Cassette-up Compartment.
(10) Turn the gear on the right side of the Cassette-up Compartment by hand in a counterclockwise direction in order to place the Cassette-up Compartment into the up state.
(11) Locate the cause of the trouble and remedy the problem.

2-11. DIAGNOSTIC FUNCTION IN SYSTEM CONTROLLER

2-11-1. Outline of Self Diagnosis

The VP-9000P has a self diagnostic function for the system control circuit which determines if the source of the problem is in the microcomputer itself or not.

The system control function is classified into mechanical and electrical operation controls. Mechanical operation control defects are efficiently analyzed using the self diagnostic function.

The VP-9000P employs six one-chip microcomputers. M1 and M2 which include the respective memories and I/O ports, are used for the master controls. M3 is for controlling the capstan motor, M4 is for controlling the display, M5 is for decoding the remote control signal and M6 is used for 33-pin interface.

2-11-2. Diagnosis Method

When SW1 on the SY-106A board is set to the ON position, the self diagnostic function is activated. For the diagnostic result display, the input and output data of the microcomputer's I/O port is displayed four bits at a time for each test address, as shown on pages 2-14 through 2-17.

When the RESET button is pressed, the test address is displayed. When the MARK IN A button is pressed while the RESET button is pressed, the LSB of the test address is changed as shown below.

→ 0 → 1 → 2 → ··· → 9 → L → H → P → R → -(minus) → (blank)

When the MARK IN B button is pressed while the RESET button is pressed, the MSB of the test address is changed as shown below.

→ 0 → 1 → 2

Twenty-six test addresses are available in hexadecimal notation. Therefore, when the RESET, MARK IN A and MARK IN B buttons are pressed, any test address data (digits 1 through 4) shown in the table on pages 2-14 through 2-17 can be displayed on the front panel LEDs. On the LED display, the logic "H" is displayed "1", and the logic "L" is "0". This logic value is changed depending on the VTR operating condition.

Therefore, the H:DRUM STOP signal at test address "01" can be observed by the following procedure.

(Operation)	(LED display) CTL display	(Remarks)
SW1/SY-106A board — ON	1100	DIAGNOSTICS MODE
Press the RESET button	00	TEST ADDRESS = 00
Press the MARK IN A button once while pressing the RESET button	01	TEST ADDRESS = 01
Release the RESET button	1111	Data for 01

H:DRUM STOP signal

If the drum is stopped at this time, the MSB displays "1" ("H"). When the cassette tape is inserted into the VTR and the VTR is put into the PLAY mode, the display "1" is changed to "0" (which indicates the rotation command).

The input and output signals of the microcomputer in each mode are shown in the timing chart on pages 2-19 through 2-34. If an input signal is properly sent to the microcomputer in each mode, the microcomputer sends an output signal shown in the timing chart.

2-11-3. Troubleshooting

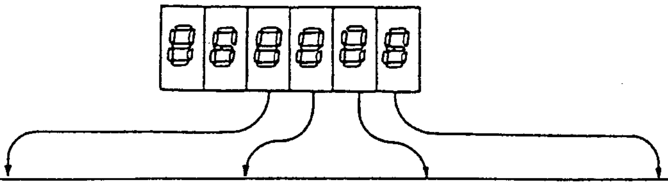
The troubleshooting with the self diagnostic function is described below.

The mode conversion diagram of the mechanical operation is shown on page 2-18. Referring to this diagram, check where the present trouble occurs during mode conversion, or where malfunctions are found during mechanism (e.g., motor or solenoid) operation. When the mode in which the trouble occurs is detected, refer to the timing chart described in the mode conversion diagram. The timing chart shows the input and output signals of the microcomputer in each mode.

Therefore, when the motor or solenoid is abnormal, observe the output signal line using an LED to check whether it is changed as shown in the timing chart. When the output signal from the microcomputer is normal, check the output signal of the next microcomputer. This process is continued. If the signal line is not changed as shown in the timing chart, refer to the schematic diagram for the trouble location. The timing chart lists an input/output signal name, signal display test address and digit, and the microcomputer pin name through which a signal is input and output.

For example, the H:DRUM STOP signal is "01-DIGIT 1" and is displayed in the MSB (digit 1) when the test address is "01". Whether the input and output signals are changed as shown in the timing chart is checked with the actual VTR operation.

2-11-4. Diagnosis List



TEST ADDRESS	DISPLAYED DATA				INPUT/OUTPUT PORT NAME ON THE MICRO PROCESSOR	
	DIGIT 1	DIGIT 2	DIGIT 3	DIGIT 4		
00	CAPSTAN CMD FWD/$\overline{\text{REW}}$ 1=FWD CMD 0=REV CMD	DRUM NORMAL/$\overline{\text{SEARCH}}$ 1=NORMAL 0=SEARCH MODE	0	0	E1	OUT/IC7 on SY
01	H:DRUM STOP CMD 1=DRUM STOP 0=DRUM ROTATE	1	1	1	E2	OUT/IC7 on SY
02	CTL COUNT UP/$\overline{\text{DOWN}}$ 1=COUNT UP 0=COUNT DOWN	1	1	1	E3	OUT/IC7 on SY
03	H:REEL REV 1=SEARCH REV MODE	H:REEL FWD 1=PLAY.REC.orSEARCH FWD MODE	H:REEL STILL 1=PLAY(REC)PAUSE or SEARCH PAUSE	H:REEL STOP 1=STOP MODE	P	OUT/IC7 on SY
04	H:REEL FF/REW 1=FF or REW MODE 0=other mode	L:SEARCH SOL.ON 1=OFF 0=ON	L:PINCH SOL.ON 1=OFF 0=ON	1	0	OUT/IC7 on SY
05	L:T-BRAKE SOL.ON 1=OFF 0=ON	L:S-BRAKE SOL.ON 1=OFF 0=ON	L:T-IDLER SOL.ON 1=OFF 0=ON	L:S-IDLER SOL.ON 1=OFF 0=ON	E0	OUT/IC7 on SY
06	SEARCH SPEED DATA (NOTE 1)				R2	OUT/IC7 on SY
07	L:CASSETTE COMPARTMENT UP CMD 0=UP	L:CASSETTE COMPARTMENT DOWN CMD 0=UP DOWN	L:THREAD MOTOR ON 0=THREAD	L:UNTHREAD MOTOR ON 0=UNTHREAD	R3	OUT/IC7 on SY
08	L:SERVO LOCK 1=UNLOCK 0=LOCK	L : FR－UNTHREAD POSITION	H:CASSETTE DOWN 1=DOWN (NOTE 2)	H:CASSETTE IN 1=INSERTED	K	IN/IC7 on SY
09	H:DRUM STOP 1=STOP 0=ROTATE	L : REEL STOP 1=STOP 0=ROTATE	H:T-IDLER ON 1=ON 0=OFF	H:T-REEL STOP 1=STOP 0=ROTATE		
0L	L:CAPSTAN STOP 1=ROTATE 0=STOP	CAPSTAN $\overline{\text{FWD/REV}}$ 1=FWD 0=REV	UNTHREAD END (NOTE 3)	THREAD END	R1	IN/IC7 on SY
0H	0	0	PAUSE SELECT-1 (NOTE 4)	PAUSE SELECT-0	E4	IN/IC7 on SY
0P	L:DRUM ROTATE 1=STOP 0=ROTATE	L:CASSETTE CONNECT 0=COMPARTMENT IS CONNECTED	L:SLACK DET:OFF (NOTE 5)	0	E5	IN/IC7 on SY
0R	RING SLACK ERROR MESSAGE (NOTE 6) The condition of VTR is detected by IC7/SY board when the ring slack occurs. The RING SLACK means that the threading ring isn't rotating.					
0-	0	0	0	0		
0(Blank)	0	0	0	0		

10	H:FF KEY ON 1=ON 0=OFF	H:PLAY KEY ON 1=ON 0=OFF	H:REW KEY ON 1=ON 0=OFF	H:STOP KEY ON 1=ON 0=OFF
11	0	0	0	H:PAUSE KEY ON 1=ON 0=OFF
12	0	0	0	H:EJECT KEY ON 1=ON 0=OFF
13	H:SERCH CMD 1=SERCH 0=NORMAL	FWD/$\overline{\text{REV}}$ CMD 1=FWD 0=REV	0	0
14	H:TIMER PLAY SW ON 1=ON 0=OFF	0	H:TIMER PLAY STATUS 1=TIMER PLAY 0=OTHER MODE	0
15	CTL/$\overline{\text{FC}}$ SW 1=CTL 0=FC	0	0	0
16	0	EIA/$\overline{\text{CCIR}}$ 1=EIA 0=CCIR	L:DEW DET 1=NOT DETECTED 0=DETECTED	H:PROGRAM REW SW 1=ON 0=OFF
17	H:KEY REQUEST 1=ANY KEY IS TURNED ON	H:REQUEST CMD 1=GOES INTO ANY MODE DURING PROGRAM OPERATION	0	H:PROGRAM REPEAT SW 1=ON 0=OFF
18	SEARCH SPEED DATA (NOTE 1) ←→			
19	1	1	1	1
1L	1	1	1	1
1H	1	L:RM-690 INHIBIT 1=ENABLED 0=INHIBITED	L:NO CTL 1=NORMAL 0=NO CTL IN PLAY MODE	0
1P	H:REW LED 1=ON 0=OFF	0	0	0
1R	0	H:PAUSE LED 1=ON 0=OFF	H:PLAY LED 1=ON 0=OFF	H:FF LED 1=ON 0=OFF
1-	H:STD-BY LED 1=ON 0=OFF	H:REV SEARCH LED 1=ON 0=OFF	H:FWD SEARCH LED 1=ON 0=OFF	0
1(Blank)	H:FC LED 1=ON 0=OFF	H:KEY INHIBIT 1=SW ON BKU-701 INHIBITS FRONT KEYS	H:HOURS METER ON 1=METER ON 0=METER OFF	H:BKU CONNECTED 1=CONNECTED 0=NOT CONNECTED

20	REEL SLACK ERROR MESSAGE (NOTE 7) The condition of VTR is detected by IC12/SY board when the reel slack occurs. The REEL SLACK means that the reel motor is not rotating.			
21	0	0	0	0
22	0	0	0	0
23	L:UNTHREAD (1=OTHER MODE 0=UNTHREAD MODE	L:RX-DATA REC (1=OTHER MODE 0=RX-DATA REC MODE	L:VIDEO MUTE (1=VIDEO is OUTPUT 0=VIDEO is MUTED	H:AUDIO MUTE (1=AUDIO is MUTE 0=AUDIO is OUTPUT
24	1	0	1	0
25	0	0	0	0
26	0	0	0	0

NOTE 1 SEARCH SPEED DATA

DATA DISPLAYED	TAPE SPEED
0 0 0 0	NOISELESS STILL
0 0 0 1	×1/30
0 0 1 0	×1/10
0 0 1 1	×1/5
0 1 0 0	×1/2
0 1 0 1	×1
0 1 1 0	×2
0 1 1 1	×5
1 0 0 0	×8
1 0 0 1	STILL

NOTE 2 CASSETTE POSITION

CASSETTE DOWN	CASSETTE IN	CASSETTE POSITION
0	0	DURING CASSETTE-IN
0	1	DURING CASSETTE-DOWN
1	0	CASSETTE-UP COMPLETION
1	1	CASSETTE-DOWN COMPLETION

NOTE 3 THREAD END/UNTHREAD END

UNTHREAD END	THREAD END	THREADING RING POSITION
1	1	Between CASSETTE-IN and FR-STOP
0	1	THREAD END position
0	0	Between FR-STOP and THREAD END
1	0	FR-STOP position

NOTE 4 PAUSE SELECT-1/PAUSE SELECT-0

PAUSE SELECT-1	PAUSE SELECT-0	PAUSE TIMER
0	1	8 min
1	1	1 min
1	0	10 sec
0	0	2 sec

NOTE 5 SLACK DETECT
When shorting between TP 3 and GND(E1) on The SY board, SLACK Detector does not operate.
Normal state is "H".

NOTE 6 RING SLACK ERROR MESSAGE(This item shows that the mode when the RING SLACK occurs.)

DATA DISPLAYED	CONDITION
0 0 0 0	RING SLACK is not occurring.
0 0 0 1	CASSETTE DOWN →FR-STOP
0 0 1 0	FR-STOP →THREAD END
0 1 0 0	FR-STOP →CASSETTE DOWN
0 1 0 1	DURING CASSETTE IN

NOTE 7 REEL SLACK ERROR MESSAGE(This item shows that the mode when the RING SLACK occurs.)

DATA DISPLAY				CONDITION
0	0	0	0	REEL SLACK DOES NOT OCCUR
0	1	1	0	FF or REW MODE
0	1	1	1	FR-STOP →FR UNTHREAD
1	0	0	0	THEND → FR-STOP
1	0	0	1	×5 or ×8 SPEED MODE
1	0	1	0	×1 or ×2 SPEED MODE
1	0	1	1	×1/2 SPEED MODE
1	1	0	0	×1/5 SPEED MODE
1	1	0	1	×1/10 SPEED MODE
1	1	1	0	×1/30 SPEED MODE

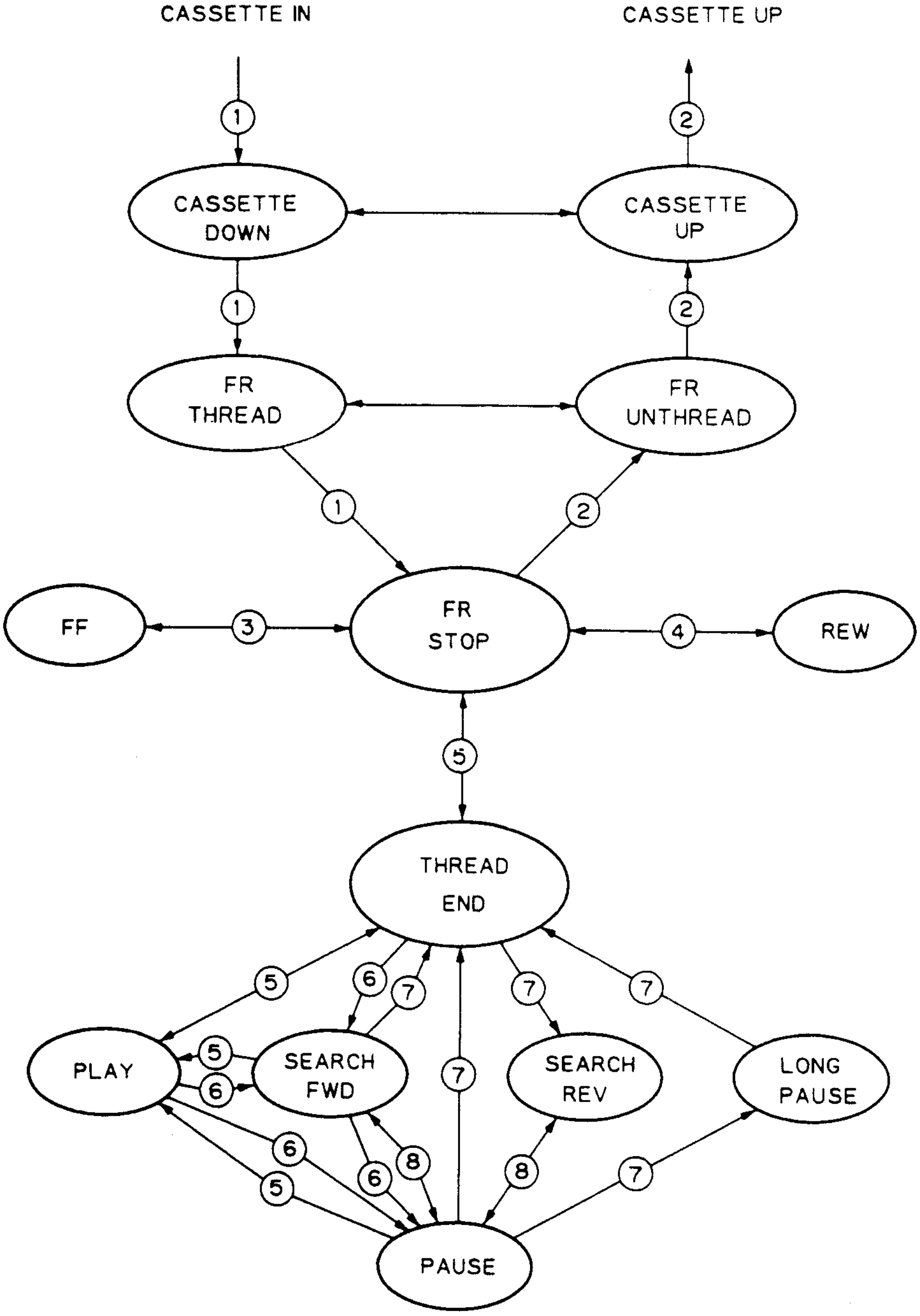
Selecting the Long Pause Timer

TYPE 7 and 9 Series can be select four pattern as the following setting. (The former models can be only one select, 8 min.)

It is can be controlled by TP5 (Address E-6) and JW144 (Address G-2).

JW144	TP5	PAUSE TIMER
SHORT	OPEN	8 min.
SHORT	GND SHORT	2 sec.
OPEN	OPEN	1 min.
OPEN	GND SHORT	10 sec.

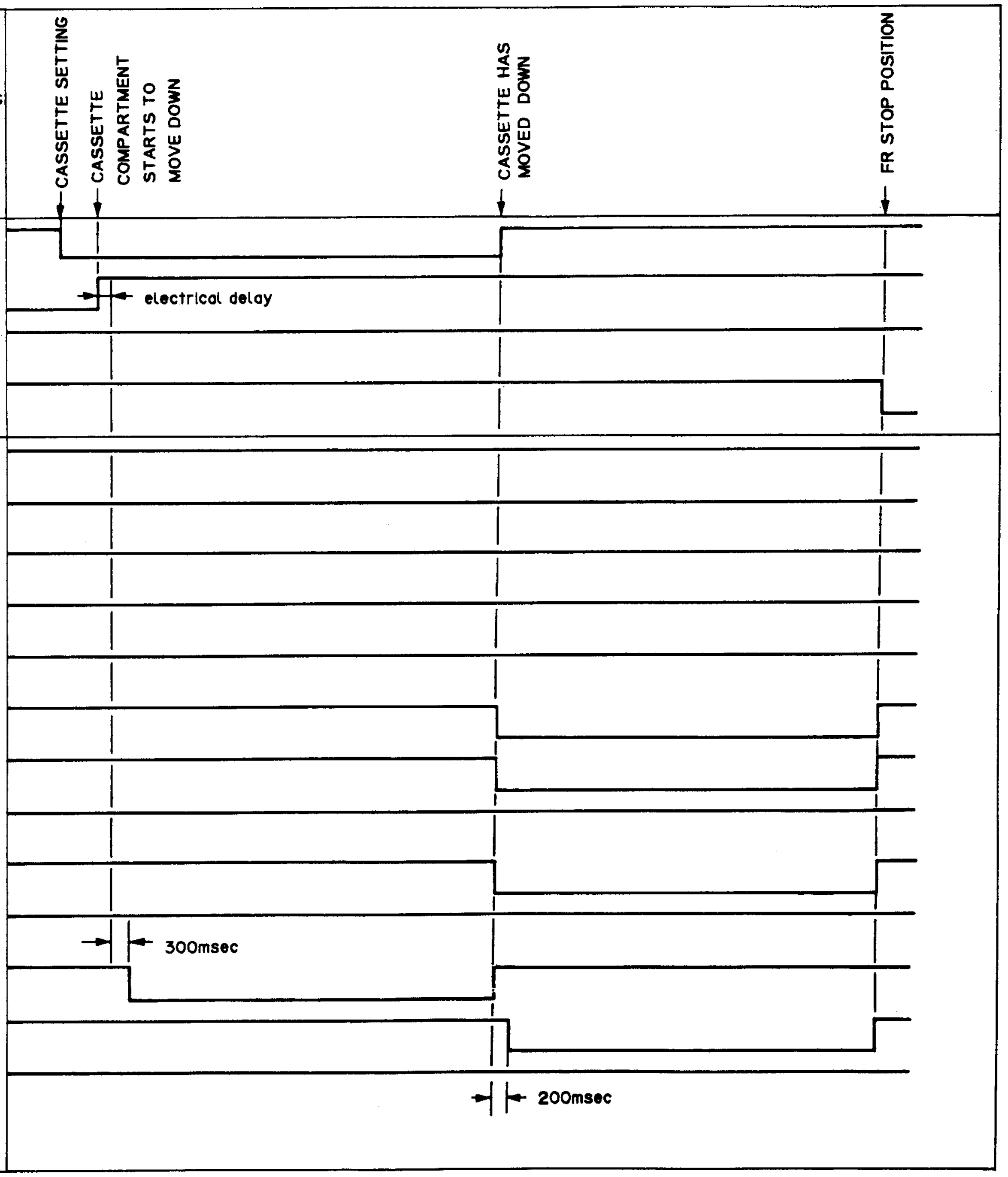
2-11-5. Mode Conversion Diagram and Timing Chart


CASSETTE IN
CASSETTE UP
CASSETTE DOWN
CASSETTE UP
FR THREAD
FR UNTHREAD
FF
FR STOP
REW
THREAD END
PLAY
SEARCH FWD
SEARCH REV
LONG PAUSE
PAUSE
①
②
③
④
⑤
⑥
⑦
⑧

NOTE: Number in the Figure means title number of Timing chart (page 2-19 through 2-34).

1. THREADING OPERATION (CASSETTE IN→CASSETTE DOWN→FR STOP POSITION)

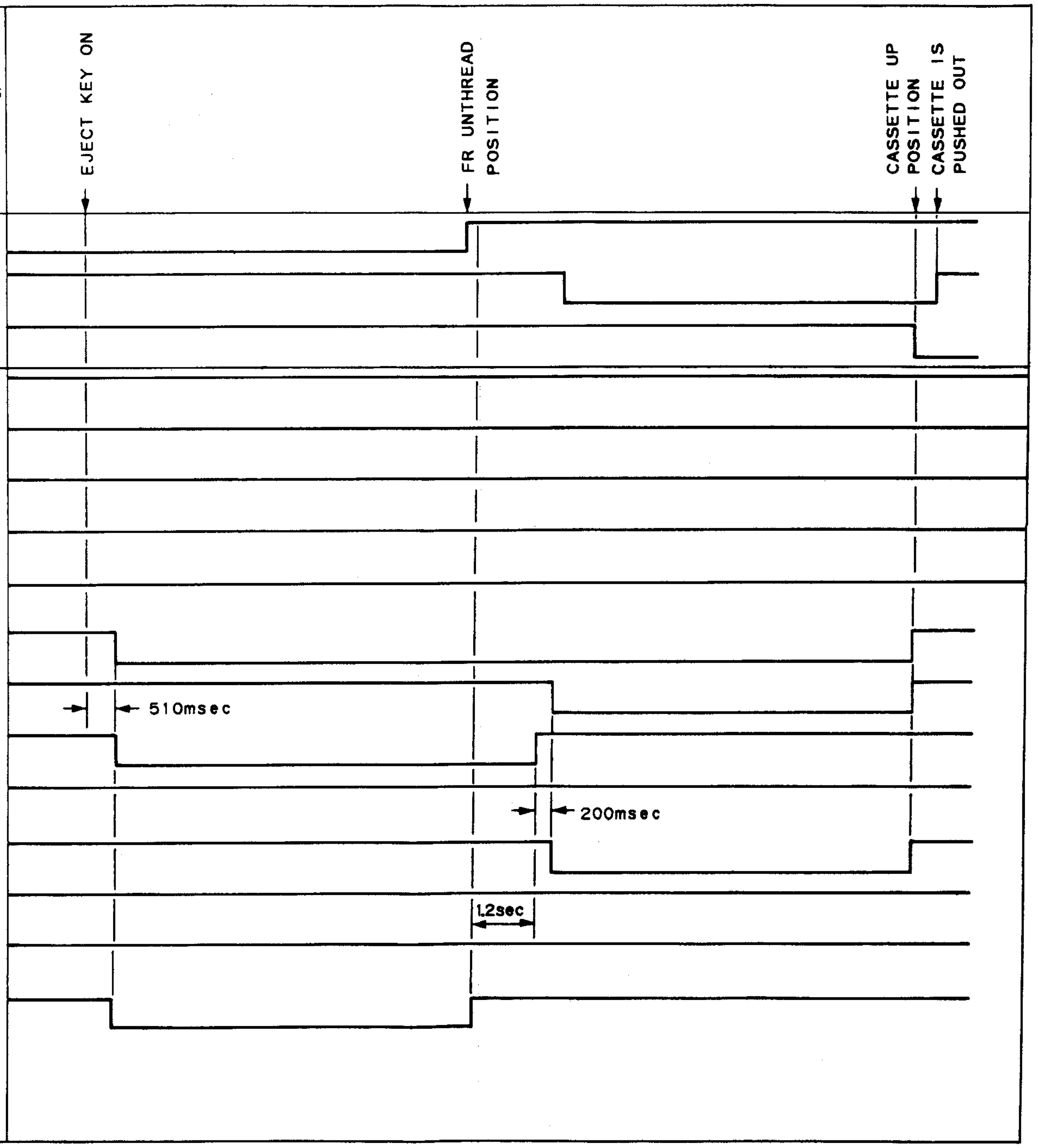
	SIGNAL	LABEL NUMBER ON DIAGNOSTICS	MEASURING POINT
INPUT	H : CASSETTE DOWN	08 — DIGIT 3	IC7-18
	H : CASSETTE IN	08 — DIGIT 4	IC7-17
	L : THREAD END	OL — DIGIT 4	IC7-5
	L : UNTHREAD END	OL — DIGIT 3	IC7-6
OUTPUT	FWD / $\overline{\text{REV}}$	00 — DIGIT 1	IC7-41
	NORMAL / $\overline{\text{SEARCH}}$	00 — DIGIT 2	IC7-40
	H : DRUM STOP	01 — DIGIT 1	IC7-45
	L : SEARCH SOL.ON	04 — DIGIT 2	IC7-23
	L : PINCH SOL.ON	04 — DIGIT 3	IC7-22
	L : T-BRAKE SOL.ON	05 — DIGIT 1	IC7-37
	L : S-BRAKE SOL.ON	05 — DIGIT 2	IC7-36
	L : T-IDLER SOL.ON	05 — DIGIT 3	IC7-35
	L : S-IDLER SOL.ON	05 — DIGIT 4	IC7-34
	L : C.C.UP	07 — DIGIT 1	IC7-16
	L : C.C.DOWN	07 — DIGIT 2	IC7-15
	L : THREAD MOTOR ON	07 — DIGIT 3	IC7-14
	L : UNTHREAD MOTOR ON	07 — DIGIT 4	IC7-13
			ON SY BOARD


CASSETTE SETTING
CASSETTE COMPARTMENT STARTS TO MOVE DOWN
CASSETTE HAS MOVED DOWN
FR STOP POSITION
electrical delay
300msec
200msec

C.C. = CASSETTE UP COMPARTMENT

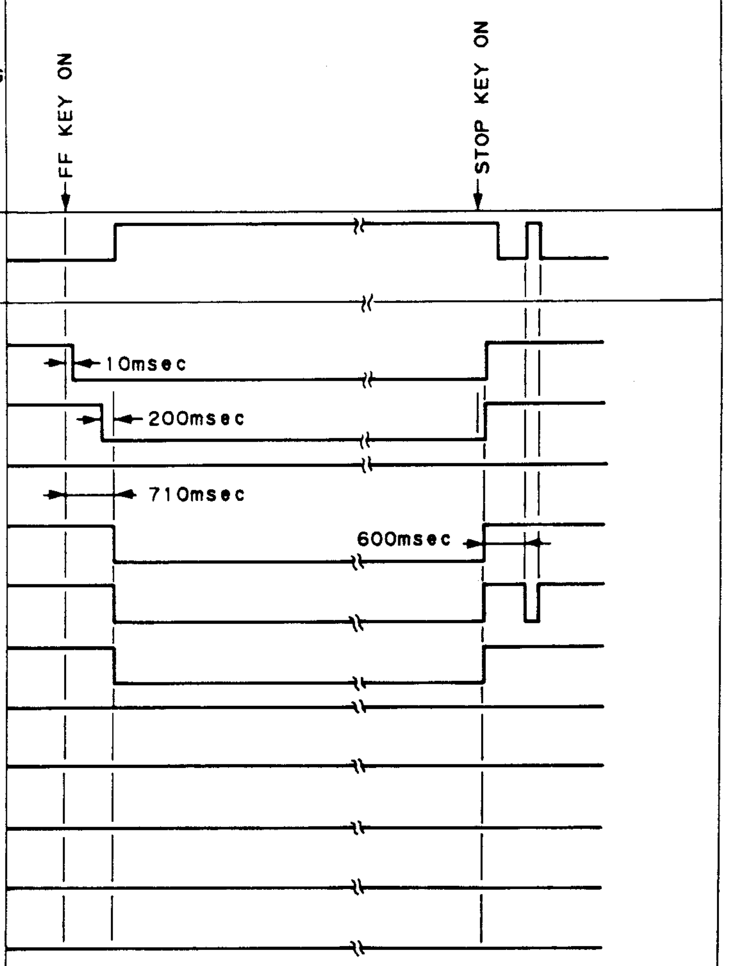
2. UNTHREADING OPERATION (FR STOP POSITION→FR UNTHREAD END POSITION→CASSETTE UP)

	SIGNAL	LABEL NUMBER ON DIAGNOSTICS	MEASURING POINT
INPUT	L : FR UNTHREAD END	08 — DIGIT 2	IC7-19
	H : CASSETTE DOWN	08 — DIGIT 3	IC7-18
	H : CASSETTE IN	08 — DIGIT 4	IC7-17
OUTPUT	FWD / $\overline{\text{REV}}$	00 — DIGIT 1	IC7-41
	NORMAL / $\overline{\text{SEARCH}}$	00 — DIGIT 2	IC7-40
	H : DRUM STOP	01 — DIGIT 1	IC7-45
	L : SEARCH SOL.ON	04 — DIGIT 2	IC7-23
	L : PINCH SOL.ON	04 — DIGIT 3	IC7-22
	L : T-BRAKE SOL.ON	05 — DIGIT 1	IC7-37
	L : S-BRAKE SOL.ON	05 — DIGIT 2	IC7-36
	L : T-IDLER SOL.ON	05 — DIGIT 3	IC7-35
	L : S-IDLER SOL.ON	05 — DIGIT 4	IC7-34
	L : C.C.UP	07 — DIGIT 1	IC7-16
	L : C.C.DOWN	07 — DIGIT 2	IC7-15
	L : THREAD MOTOR ON	07 — DIGIT 3	IC7-14
	L : UNTHREAD MOTOR ON	07 — DIGIT 4	IC7-13
			ON SY BOARD


EJECT KEY ON
FR UNTHREAD POSITION
CASSETTE UP POSITION
CASSETTE IS PUSHED OUT
510msec
200msec
1.2sec

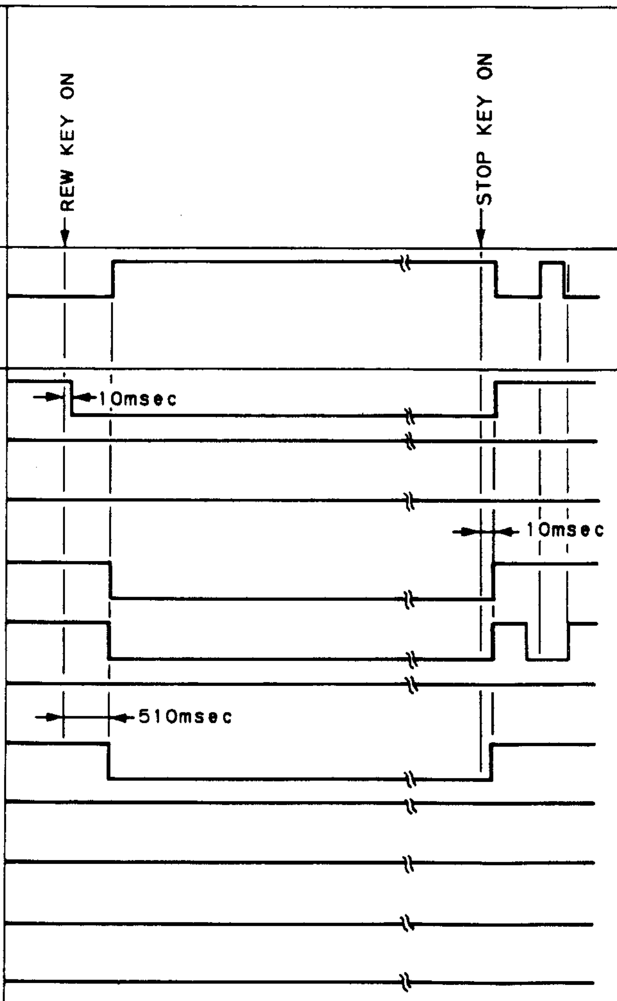
3. FF MODE (FR STOP→FF→FR STOP)

	SIGNRL	LABEL NUMBER ON DIAGNOSTICS	MEASURING POINT
INPUT	L : REEL STOP	09 — DIGIT 2	
OUTPUT	H : DRUM STOP	01 — DIGIT 1	IC7-45
	L : SEARCH SOL.ON	04 — DIGIT 2	IC7-23
	L : PINCH SOL.ON	04 — DIGIT 3	IC7-22
	L : T-BRAKE SOL.ON	05 — DIGIT 1	IC7-37
	L : S-BRAKE SOL.ON	05 — DIGIT 2	IC7-36
	L : T-IDLER SOL.ON	05 — DIGIT 3	IC7-35
	L : S-IDLER SOL.ON	05 — DIGIT 4	IC7-34
	L : C.C.UP	07 — DIGIT 1	IC7-16
	L : C.C.DOWN	07 — DIGIT 2	IC7-15
	L : THREAD MOTOR ON	07 — DIGIT 3	IC7-14
	L : UNTHREAD MOTOR ON	07 — DIGIT 4	IC7-13
			ON SY BOARD


FF KEY ON
STOP KEY ON
10msec
200msec
710msec
600msec

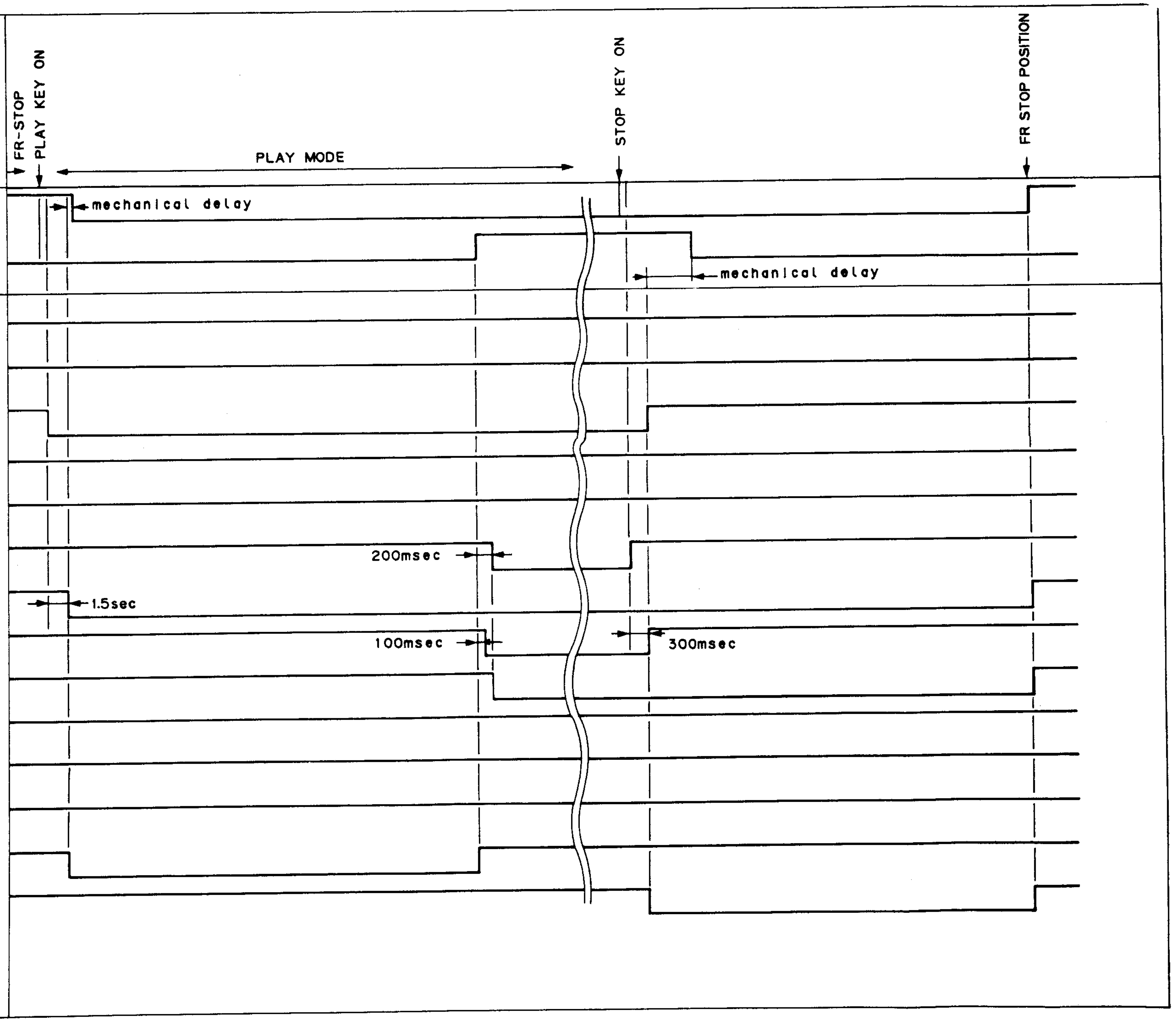
4. REW MODE (FR STOP→REW→FR STOP)

	SIGNAL	LABEL NUMBER ON DIAGNOSTICS	MEASURING POINT
INPUT	L : REEL STOP	09 — DIGIT 2	
OUTPUT	H : DRUM STOP	01 — DIGIT 1	IC7-45
	L : SEARCH SOL.ON	04 — DIGIT 2	IC7-23
	L : PINCH SOL.ON	04 — DIGIT 3	IC7-22
	L : T-BRAKE SOL.ON	05 — DIGIT 1	IC7-37
	L : S-BRAKE SOL.ON	05 — DIGIT 2	IC7-36
	L : T-IDLER SOL.ON	05 — DIGIT 3	IC7-35
	L : S-IDLER SOL.ON	05 — DIGIT 4	IC7-34
	L : C.C. UP	07 — DIGIT 1	IC7-16
	L : C.C. DOWN	07 — DIGIT 2	IC7-15
	L : THREAD MOTOR ON	07 — DIGIT 3	IC7-14
	L : UNTHREAD MOTOR ON	07 — DIGIT 4	IC7-13
			ON SY BOARD



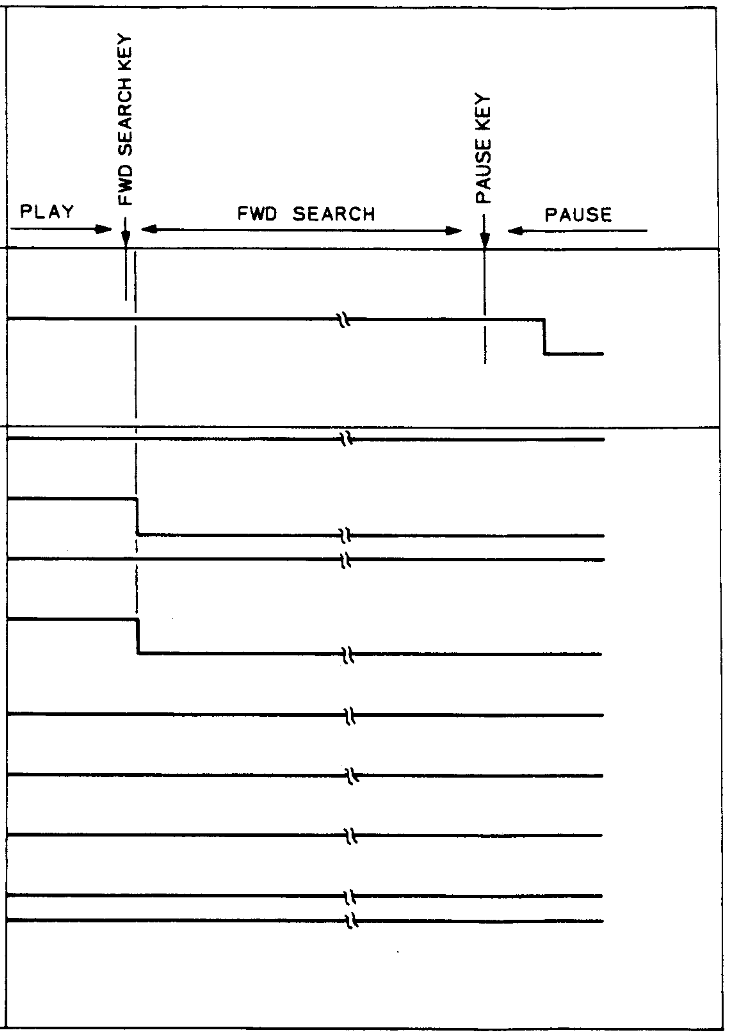
5. PLAY MODE (FR STOP→PLAY→FR STOP)

	SIGNAL	LABEL NUMBER ON DIAGNOSTICS	MEASURING POINT
INPUT	L : THREAD END	OL — DIGIT 4	IC7-5
	L : UNTHREAD END	OL — DIGIT 3	IC7-6
OUTPUT	FWD / $\overline{\text{REV}}$	00 — DIGIT 1	IC7-41
	NORMAL / $\overline{\text{SEARCH}}$	00 — DIGIT 2	IC7-40
	H : DRUM STOP	01 — DIGIT 1	IC7-45
	H : REEL STILL	03 — DIGIT 3	IC7-58
	L : SEARCH SOL.ON	04 — DIGIT 2	IC7-23
	L : PINCHH SOL.ON	04 — DIGIT 3	IC7-22
	L : T-BRAKE SOL.ON	05 — DIGIT 1	IC7-37
	L : S-BRAKE SOL.ON	05 — DIGIT 2	IC7-36
	L : T-IDLER SOL.ON	05 — DIGIT 3	IC7-35
	L : S-IDLER SOL.ON	05 — DIGIT 4	IC7-34
	L : C.C UP	07 — DIGIT 1	IC7-16
	L : C.C DOWN	07 — DIGIT 2	IC7-15
	L : THREAD MOTOR ON	07 — DIGIT 3	IC7-14
	L : UNTHREAD MOTOR ON	07 — DIGIT 4	IC7-13
			ON SY BOARD


FR-STOP
PLAY KEY ON
PLAY MODE
STOP KEY ON
FR STOP POSITION
mechanical delay
mechanical delay
200msec
1.5sec
100msec
300msec

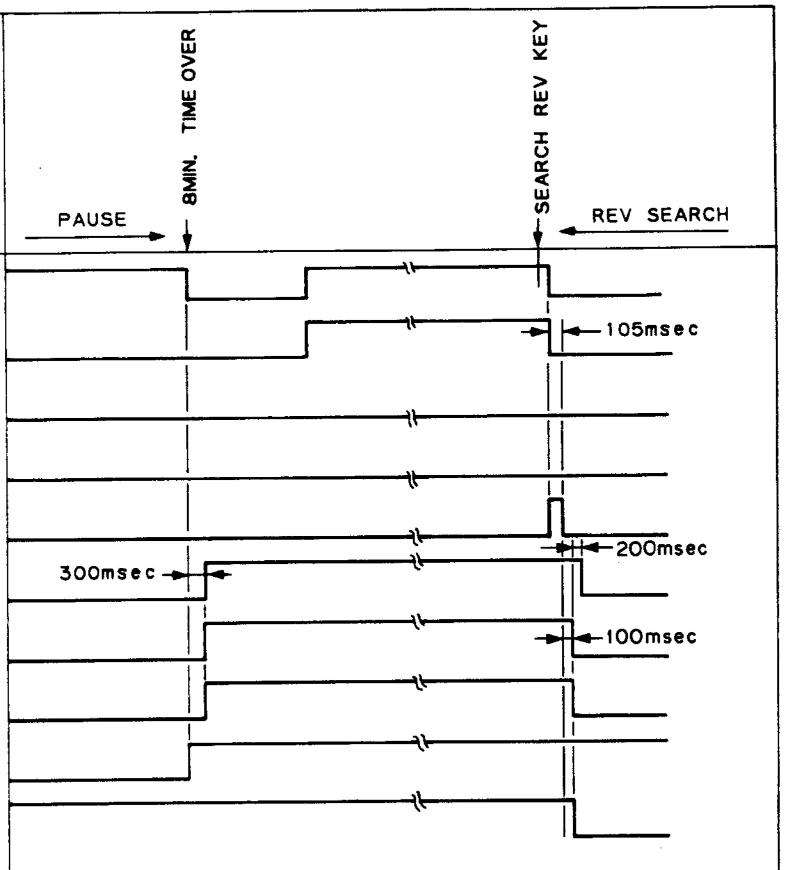
6. PLAY→FWD SEARCH→SEARCH PAUSE

	SIGNAL	LABEL NUMBER ON DIAGNOSTICS	MEASURING POINT
INPUT	L : CAPSTAN STOP	OL — DIGIT 1	IC7-8
OUTPUT	FWD / $\overline{\text{REV}}$	00 — DIGIT 1	IC7-41
	NORMAL / $\overline{\text{SEARCH}}$	00 — DIGIT 2	IC7-40
	H : REEL STILL	03 — DIGIT 3	IC7-58
	L : SEARCH SOL.ON	04 — DIGIT 2	IC7-23
	L : PINCH SOL.ON	04 — DIGIT 3	IC7-22
	L : T-BRAKE SOL.ON	05 — DIGIT 1	IC7-37
	L : S-BRAKE SOL.ON	05 — DIGIT 2	IC7-36
	L : T-IDLER SOL.ON	05 — DIGIT 3	IC7-35
	L : S-IDLER SOL.ON	05 — DIGIT 4	IC7-34
			ON SY BOARD



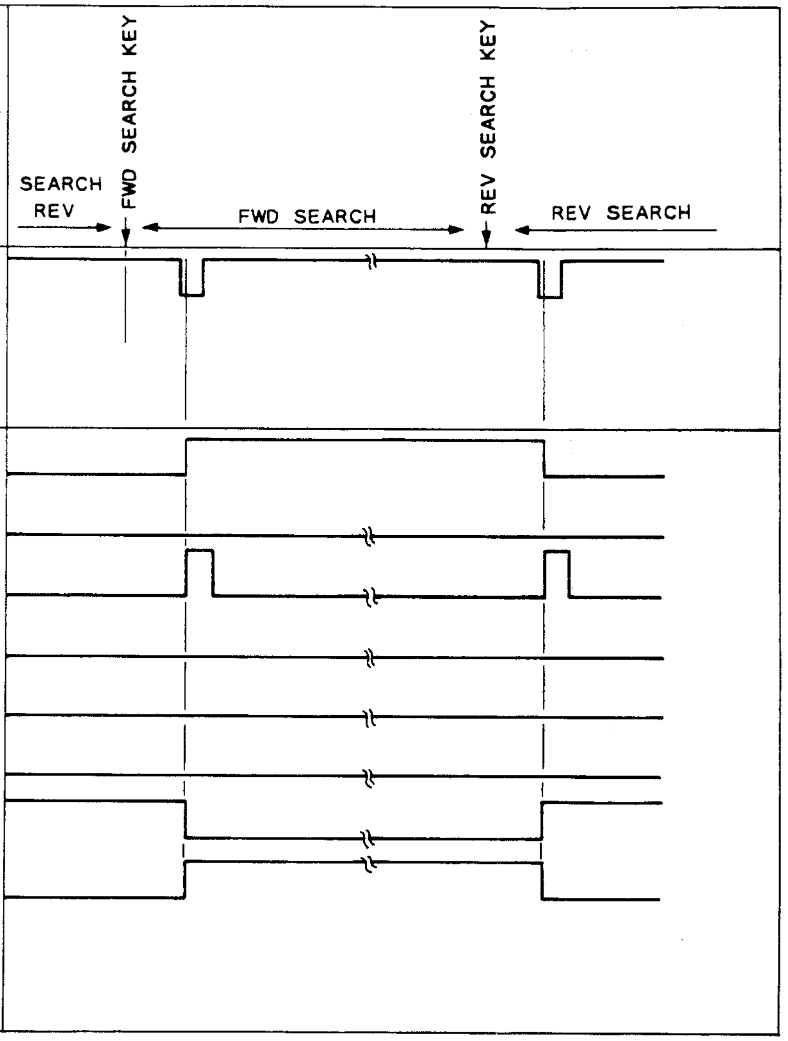
7. PLAY PAUSE→LONG PAUSE→REV SEARCH

	SIGNAL	LABEL NUMBER ON DIAGNOSTICS	MEASURING POINT
OUTPUT	FWD / $\overline{\text{REV}}$	00 — DIGIT 1	IC7-41
	NORMAL / $\overline{\text{SEARCH}}$	00 — DIGIT 2	IC7-40
	H : DRUM STOP	01 — DIGIT 1	IC7-45
	H : REEL STILL	03 — DIGIT 3	IC7-58
	L : SEARCH SOL.ON	04 — DIGIT 2	IC7-23
	L : PINCH SOL.ON	04 — DIGIT 3	IC7-22
	L : T-BRAKE SOL.ON	05 — DIGIT 1	IC7-37
	L : S-BRAKE SOL.ON	05 — DIGIT 2	IC7-36
	L : T-IDLER SOL.ON	05 — DIGIT 3	IC7-35
	L : S-IDLER SOL.ON	05 — DIGIT 4	IC7-34
			ON SY BOARD


PAUSE
8MIN. TIME OVER
SEARCH REV KEY
REV SEARCH
105msec
300msec
200msec
100msec

8. REV SEARCH →(FWD PAUSE)→FWD SEARCH→(FWD PAUSE)→REV SEARCH

	SIGNAL	LABEL NUMBER ON DIAGNOSTICS	MEASURING POINT
INPUT	L : CAPSTAN STOP	OL — DIGIT 1	IC7-8
OUTPUT	FWD / $\overline{\text{REV}}$	00 — DIGIT 1	IC7-41
	NORMAL / $\overline{\text{SEARCH}}$	00 — DIGIT 2	IC7-40
	H : REEL STILL	03 — DIGIT 3	IC7-58
	L : SEARCH SOL.ON	04 — DIGIT 2	IC7-23
	L : T-BRAKE SOL.ON	05 — DIGIT 1	IC7-37
	L : S-BRAKE SOL.ON	05 — DIGIT 2	IC7-36
	L : T-IDLER SOL.ON	05 — DIGIT 3	IC7-35
	L : S-IDLER SOL.ON	05 — DIGIT 4	IC7-34
			ON SY BOARD


SEARCH REV
FWD SEARCH KEY
FWD SEARCH
REV SEARCH KEY
REV SEARCH

2-12. FIXTURE

Part No.	Description
J-6001-820-A	Drum Eccentricity Gauge (3)
J-6001-830-A	Drum Eccentricity Gauge (2)
J-6001-840-A	Drum Eccentricity Gauge (1)
J-6001-930-A	Drum Eccentricity Gauge (4)
J-6009-830-A	Flatness Plate
J-6026-240-A	Adjustment Driver
J-6130-010-A	Reel Table Height Check Base Jig
J-6130-020-A	Reel Table Height Check Jig
J-6153-020-A	Dihedral Adjustment Driver
J-6150-140-A	Eccentricity Screwdriver
J-6153-580-A	Pinch Lever Adjustment Jig
Y-2031-001-0	Cleaning Fluid
2-034-697-00	Cleaning Piece
3-702-216-01	Back Tension Adjustment Jig
7-661-018-01	Sony Oil
7-732-050-20	Tension Scale (50g)
7-732-050-30	Tension Scale (100g)
7-732-050-40	Tension Scale (200g)
7-732-050-50	Tension Scale (500g)
8-899-999-53	Torque Measurement Tape
8-960-020-62	Alignment Tape, RR5-2SB PAL
8-960-035-61	Alignment Tape, RR5-2SC PAL
8-960-036-02	Alignment Tape, RR2-1SD PAL
8-960-036-80	Alignment Tape, RR5-1SD PAL
9-911-053-00	Thickness Gauge

SECTION 3

PERIODIC CHECK AND MAINTENANCE

It is recommended that the following maintenance and the periodic check be performed as refering to the Hours Meter of the front panel for the best operation of the function and performance of the unit and for prolonging the live of the unit and the tape.

3-1. MAINTENANCE AFTER REPAIRS

Perform the following maintenance after repairs regardless of the operating hours of the unit.

(1) Cleaning of the video heads
- Press a cleaning piece moistened with cleaning fluid to the drun and turn it slowly with the hand. (Never turn the motor with electric power to clean.)
- Never move the cleaning piece in a vertical direction of the head tip during cleaning. It might damage the head tips.

(2) Cleaning of the tape path system
- Wipe the tape bearing surfaces (such as tape guides, drum, capstan, and pinch roller) with a cleaning piece moistened with cleaning fluid.

(3) Cleaning of the drive system
- Wipe the drive system (such as belt, idler, and reel table surface) with a cleaning piece moistened with cleaning fluid.

3-2. PERIODIC CHECK

Perform the maintenance checks described separately in accordance with the operational hours of the unit.

3-3. OTHERS

(1) Sony Oil
- Be sure to use Sony Oil as the lubrication oil. (If any other oil is used, various troubles might occur because of different viscosity.)

Sony Oil : Part No. 7-661-018-01
- Use Sony Oil in which dust or other foreign material have not been mixed for lubricating the bearing. (If foreign material is in the oil, wear or burning of the bearing might occur.)

(2) Grease

Be sure to use the following grease.

Sony grease : Part No. 7-662-001-62 (SGL-501)

(3) Overhaulling of the equipment

When overhaulling the equipment is attempted, replace parts at the intervals indicated in the chart on page 3-2. For parts not in the list, such as motors and heads, refer the following items. (It supporse the usualy state of use.)
- Reel motor : about 3,000 H
- Capstan motor : about 3,000 H
- Threading motor : about 30,000 times
- Cassette-up compartment motor : about 30,000 times
- Audio/CTL head : about 3,000 H
- CTL head : about 3,000 H

■ : apply oil ○ : cleaning ◆ : replace ◇ : check ◎ : apply grease

	Operating Hours (H)											
Item	Part No. of Replacement Parts	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	Remarks
Tape path cleaning	———	○	○	○	○	○	○	○	○	○	○	Perform whenever repair work is attempted *NOTE 1
Cleaning and replacement of the video head	A-6709-602-A	○	◆	○	◆	○	◆	○	◆	○	◆	Life of the video heads are affected extensively by operating ambient conditions *NOTE 2
Replacement of pinch roller	A-6750-205-A	○	◆	○	◆	○	◆	○	◆	○	◆	Life of the pinch roller are affected extensively by operating systems *NOTE 3.
Replacement of the F FWD/REW idler belt	3-668-785-00	○	○	○	◆	○	○	○	◆	○	○	———
Replacement of the reel table	A-6739-017-A	○	■	○	◆	○	■	○	◆	○	■	
Replacement of R brake shoe	X-3668-737-0	—	—	—	◆	—	—	—	◆	—	—	
Replacement of brake band	X-3668-707-0	—	—	—	◆	—	—	—	◆	—	—	
Replacement of belt on gear box	3-672-737-01	○	○	○	○	○	○	○	◆	○	○	———
Replacement of belt on cassette-up compartment	3-653-387-00	○	○	○	○	○	○	○	◆	○	○	———
Cleaning the threading roller shaft on the threading ring	———	—	○	—	○	—	○	—	○	—	○	Clean with a cloth moistened with cleaning fluid *NOTE 4
Apply a grease on the ring rollers	———	—	◎	—	◎	—	◎	—	◎	—	◎	Apply grease on the surface of the ring roller
Check the FWD back tension	———	—	◇	—	◇	—	◇	—	◇	—	◇	*NOTE 5
Check the FWD torque	———	—	◇	—	◇	—	◇	—	◇	—	◇	*NOTE 6
Check the REV torque	———	—	◇	—	◇	—	◇	—	◇	—	◇	*NOTE 7
Check the brake torque	———	—	—	—	◇	—	◇	—	◇	—	◇	*NOTE 8

*NOTE 1 :Refer to Section 3-1.
*NOTE 2 :Refer to Section 3-1.
*NOTE 3 :After this replacement, perform the adjustments as follows: Section 4-9 "Pinch Roller Replacement".
*NOTE 4 :Refer to Section 4-6.
*NOTE 5 :Refer to Section 6-6.
*NOTE 6 :Refer to Section 6-3.
*NOTE 7 :Refer to Section 6-4.
*NOTE 8 :Refer to Section 6-1.

SECTION 4
REPLACEMENT OF MAJOR PARTS

4-1. REPLACEMENT OF THE UPPER DRUM

. The Rotary Video Heads cannot be replaced individually. The entire Upper Drum Assembly should be replaced when any of these heads fails.

Tool: Drum eccentricity gauge (1)
Drum eccentricity gauge (2)
Drum eccentricity gauge (3)
Drum eccentricity gauge (4)

Replacement procedure:

(1) Unsolder the four leads of the video head from the printed circuit board. Remove the two fixing screws and then remove the Upper Drum Assembly from the Head Drum Assembly.

(2) Clean the matching surfaces of the flange and new Upper Drum Assembly with a cloth moistened with cleaning fluid. (If there is a spacer between the drum and the flange, it should be left on the flange. If the spacer is lost, correct interchangability cannot be obtained.)

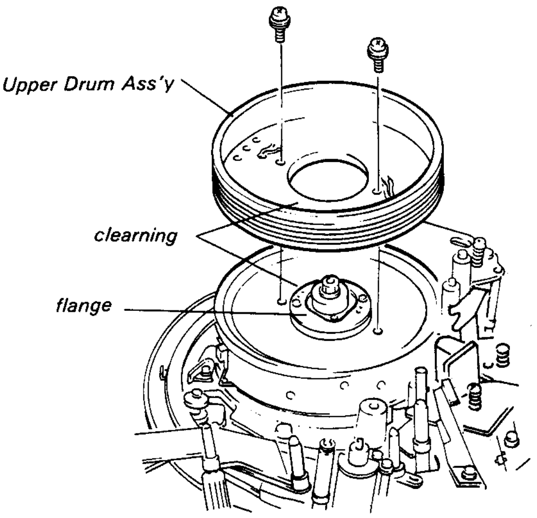
(3) Place the Upper Drum Assembly as shown in the figure. Thread the two fixing screws snugly but do not tighten them.

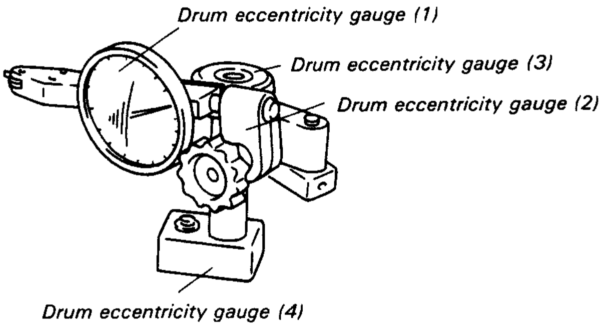
Adjustment procedure:

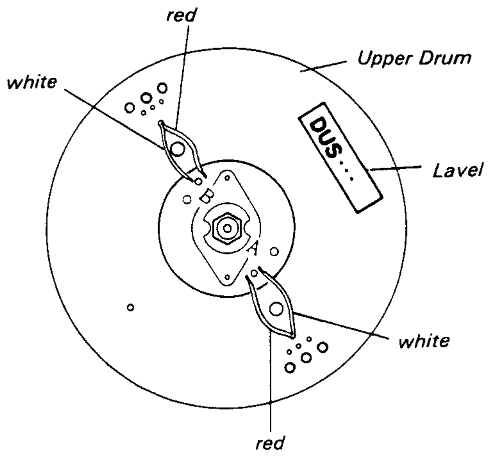
(1) Remove the S Guard Block. (The connector at the bottom of the S Guard is inserted into the connector on the chassis.)

(2) Assemble the Drum Eccentricity Gauges (1), (2), (3) and (4) as shown in the figure. Set the assembled gauges on the unit so that the probe tip is positioned at a point about 5 mm from the top edge of the Upper Drum.

(3) Turn the Upper Drum slowly in the clockwise direction and check that the gauge deflection is within 5 microns during one complete revolution of the Upper Drum. If it is within specification, proceed with the Step (5). If it is not, perform Step (4).


Upper Drum Ass'y
clearning
flange


Drum eccentricity gauge (1)
Drum eccentricity gauge (3)
Drum eccentricity gauge (2)
Drum eccentricity gauge (4)


red
Upper Drum
white
DUS...
Lavel
B
A
white
red

(4) Tap the inside of the Upper Drum with a nylon hammer or a screwdriver handle until the gauge deflection remains within 5 microns.

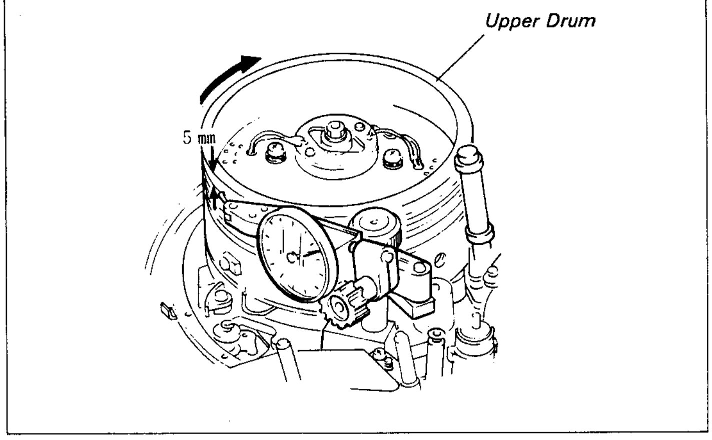
(5) After the adjustment, alternately tighten the two fixing screws of the Upper Drum. (Tightening torque: 14 to 16 kg-cm)

(6) After tightening the screws, check that the gauge deflection is within 5 microns.

(7) Solder the four leads from the video heads to the printed circuit board as shown in the figure.

(8) Install the S Guard Block. (Insert the connector at the bottom of the S Guard Block securely into the connector on the chassis.)

(9) Adjust as described in Section 4-11.



4-2. REPLACEMENT OF THE DRUM ASSEMBLY

Replacement procedure:

(1) Remove the Shield Plate.

(2) Disconnect the three connectors of the drum assembly on the back of the unit.

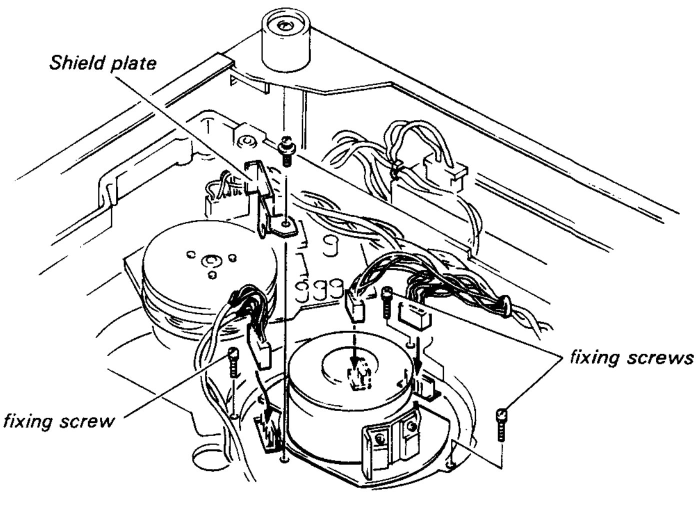
(3) Remove the three fixing screws which hold the drum.

(4) Install the drum on the base while turning the drum assembly in the clockwise direction when viewed from top of the unit.

(5) Connect the three connectors.

(6) Tighten the fixing screw of the Shield Plate.

(7) Adjust as descrebed in Section 4-11.



4-3. REPLACEMENT OF THE CAPSTAN MOTOR

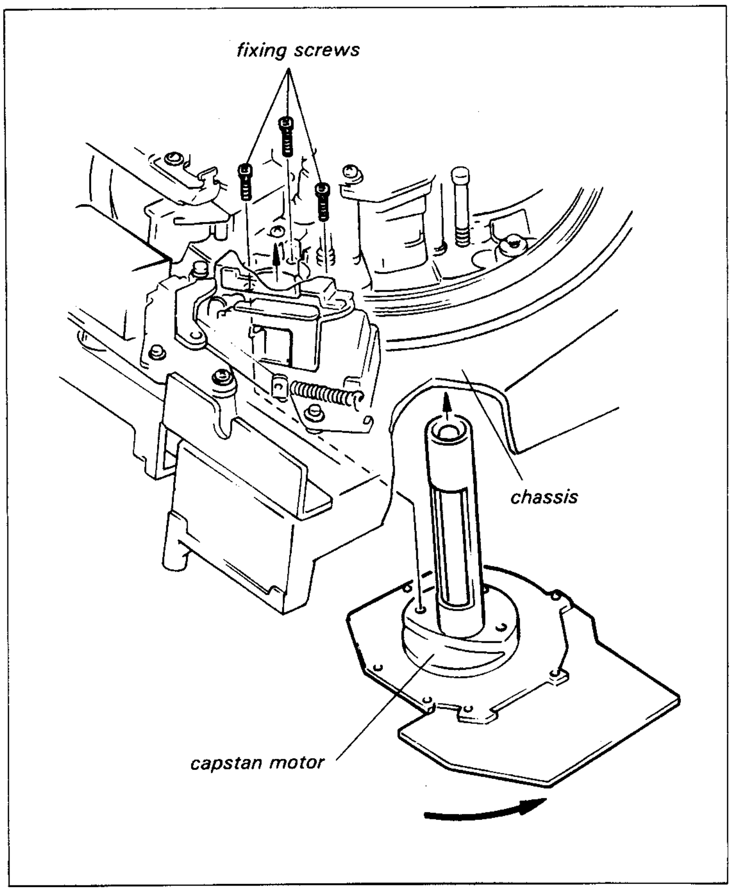
Replacement procedure:

(1) Remove the Capstan Motor from the unit.

(2) Install the new Capstan Motor and thread the three fixing screws snugly but do not tighten them.

(3) Tighten the fixing screws while turning the Capstan Motor in the direction of the arrow.

(4) Adjust as described in Section 4-11.


fixing screws
chassis
capstan motor

4-4. REPLACEMENT OF THE CTL HEAD

Replacement procedure:

(1) Disconnect CN341 on the EC-28 Board.

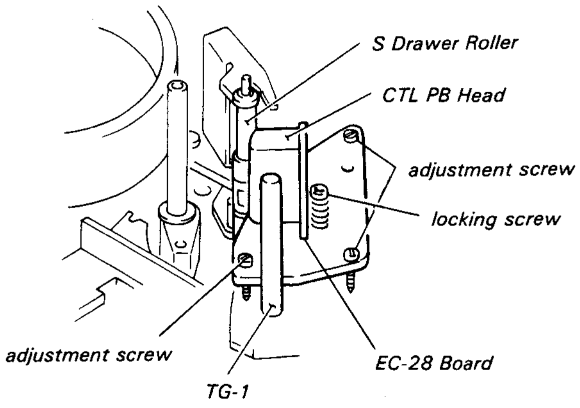
(2) Remove the locking screw and remove the CTL PB Head Block from the unit. Never tighten or loosen the three adjustment screws.

(3) Remove the two fixing screws at the bottom of the bracket and remove the head.

(4) Remove the EC-28 Board from the head and solder it to the new head.

(5) Perform steps (1) to (3) in reverse order.

(6) Adjust as described in Section 4-11.


S Drawer Roller
CTL PB Head
adjustment screw
locking screw
adjustment screw
EC-28 Board
TG-1

4-5. REPLACEMENT OF THE S DRAWER ROLLER

Replacement procedure:

(1) Put the unit into the EJECT completion mode without a cassette tape.

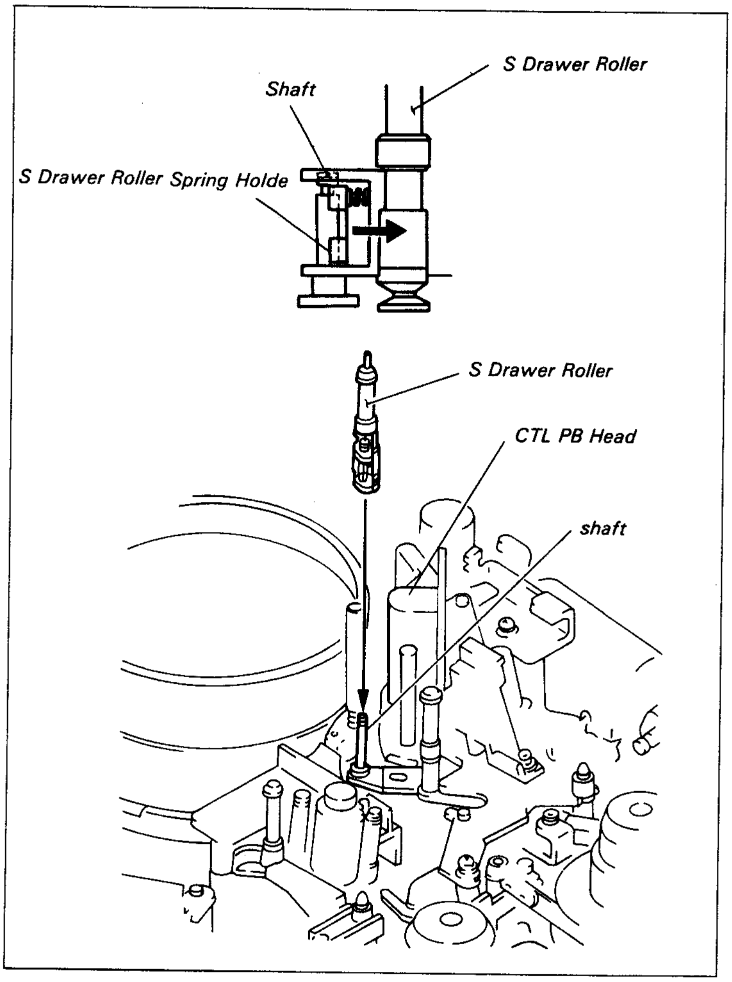
(2) Turn the pulley of the Gear Box by hand until the S Drawer Roller comes in front of the CTL PB Head.

(3) Remove the S Drawer Roller from the shaft while pushing the spring holder in the direction of the arrow.

(4) Smear a little Sony Grease in the notch at the bottom of the new S Drawer Roller.

(5) While pushing the spring holder in the direction of the arrow, install the new S Drawer Roller onto the shaft until the S Drawer Roller locks to the shaft.

(6) Adjust as described in Section 4-11.


S Drawer Roller
Shaft
S Drawer Roller Spring Holde
S Drawer Roller
CTL PB Head
shaft

4-6. REPLACEMENT / ADJUSTMENT OF THE TAPE GUIDES ON THE THREADING RING

. There are three tape guides on the Threading Ring. This section describes the replacement of the three tape guides and the width adjustment of the two tape guides.

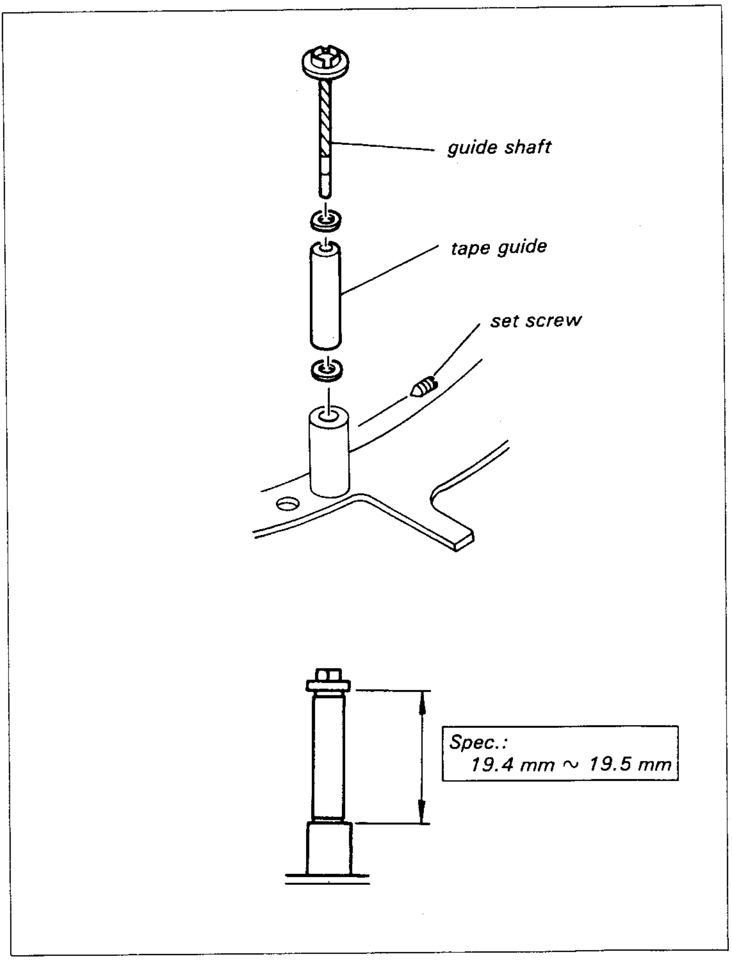
tool: slide vernier callipers of equivalent
L-shaped hexagonal wrench
(across flat has 1.27 mm)

Replacement procedure:

(1) Loosen the set screw of the boss and remove the guide shaft.
(2) Clean the guide shaft with a cloth moistened with cleaning fluid.
(3) Assemble the guide.
(4) Adjust the height of the sub-ring guide as shown in the figure.
(5) Adjust as described in Section 4-11.

Adjustment procedure:

(1) Adjust the height of the tape guide and tighten the set screw of the boss. Check that the guide roller turns smoothly.
(2) Insert the cassette tape and put the unit into the PLAY mode. Check that the tape runs along the upper flange of the tape guide without curling.
(3) Adjust as described in Section 4-11.



4-7. REPLACEMENT OF THE AUDIO/CTL HEAD

Replacement procedure:

(1) Remove the Audio/CTL Head Block from the unit after removing the three fixing screws as shown in the figure.

(2) Remove the Audio/CTL Head and the shield case (F and B) after removing the two fixing screws as shown in the figure.

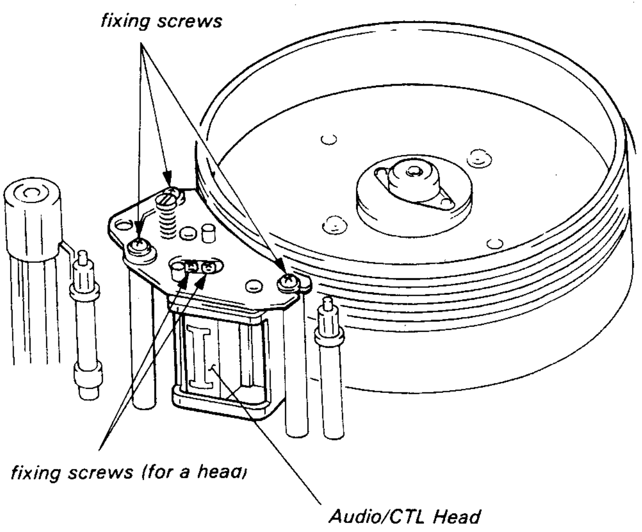
(3) Remove the two fixing screws from the shield case.

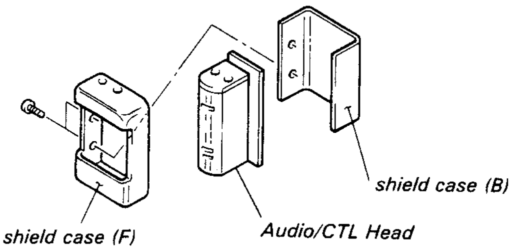
(4) Unsolder the six leads from the printed circuit board and remove the DUS-92 Board from the head.

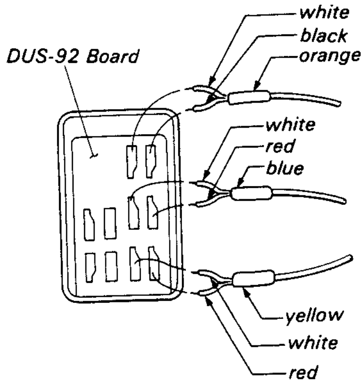
(5) Replace the head with a new one and solder the leads to the DUS-92 Board as shown in the figure.

(6) Perform steps (1) to (3) in reverse order.

(7) Adjust as described in Section 4-11.


fixing screws
fixing screws (for a head)
Audio/CTL Head


shield case (B)
shield case (F)
Audio/CTL Head


white
black
orange
DUS-92 Board
white
red
blue
yellow
white
red

4-8. REPLACEMENT OF THE THREADING RING

Replacement procedure:

(1) Remove the E Head Base Block from the unit after removing the three fixing screws.

(2) Remove the S Guard Assembly and the FR Detector from the unit.

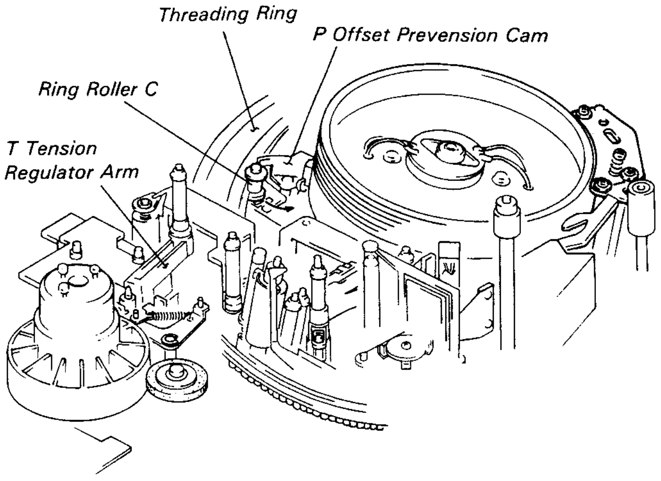
(3) Loosen the two fixing screws from the Threading Gear Block and remove it from the Threading Ring.

(4) Loosen the fixing screw and then move the Ring Roller (C) and the P Offset Prevention Cam in the direction of the arrow.

(5) Remove the Threading Ring from the unit and replace it with a new one.

(6) Perform steps (1) to (4) in reverse order.

(7) Adjust as described in Section 4-11.


Threading Ring
P Offset Prevension Cam
Ring Roller C
T Tension
Regulator Arm

4-9. REPLACEMENT OF THE PINCH ROLLER

Replacement procedure:

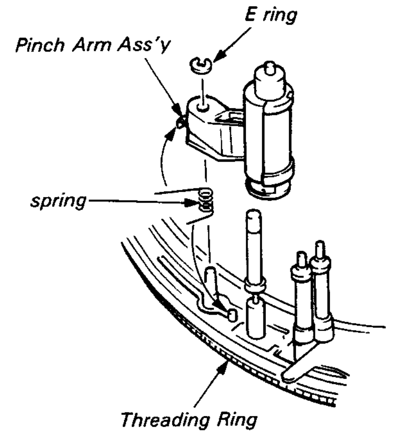
(1) Turn the pulley of the Gear Box until the S Drawer Roller is in front of the CTL PB Head.

(2) Remove the Pinch Arm Assembly from the Threading Ring after removing the E ring.

(3) Replace the Pinch Roller Assembly with a new one.

(4) Install the Pinch Roller Assembly on the Threading Ring as shown in the figure.

(5) Adjust as described in Section 4-11.



4-10. REPLACEMENT OF THE THREADING GEAR BOX SYSTEM

4-10-1. Replacement of the Threading Gear Box

Replacement procedure:

(1) Put the unit into the EJECT mode and turn the power OFF.

(2) Remove the T Tape Sensor from the gear box after removing the fixing screw.

(3) Remove the two fixing screws of the gear box after turning the pulley 1 revolution in the direction of arrow A, Move the gear box in the direction of arrow B and remove it from the unit.

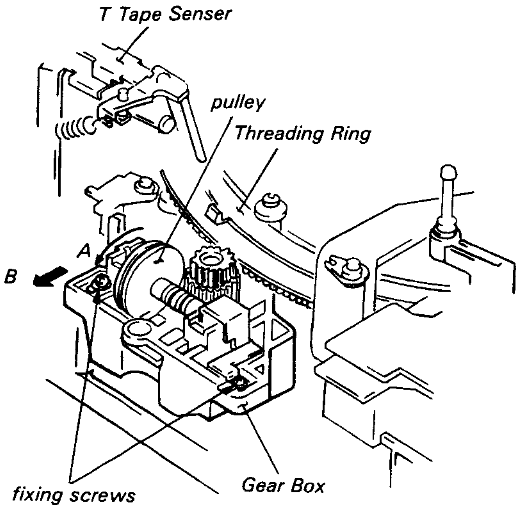
(4) Remove the harness from the clamper and disconnect CN511 from the SY-106A Board.

(5) Replace the gear box with a new one.

(6) Perform steps (3) and (4) in reverse order.

(7) Put the gear box on the chassis and thread the two fixing screws snugly but do not tighten them. Tighten the two fixing screws of the gear box after meshing the Threading Ring to the gear.

(8) Adjust as described in Section 4-11.



4-10-2. Replacement of the Threading Motor

Tool: L-shaped hexagonal wrench
(across flat has 1.5 mm)

Replacement procedure:

(1) Perform steps (1) to (4) of Section 4-10-1, Replacement of the Threading Gear Box.

(2) Remove the gear after removing the stop ring.

(3) Remove the belt from the motor pulley. Remove the plate from the frame after removing the fixing screw.

(4) Remove the pulley while pushing the hook in the direction of the arrow as shown in the figure.

(5) Remove the motor block from the frame after removing the two fixing screws.

(6) Loosen the set screw and remove the motor pulley.

(7) Remove the motor from the motor bracket after removing the two fixing screws.

(8) Remove the shield case and unsolder the LM-13 Board. Replace the motor with a new one.

(9) The pole of the motor is as shown in the figure. Solder the plus terminal of the motor to the plus pad of the LM-13 Board.

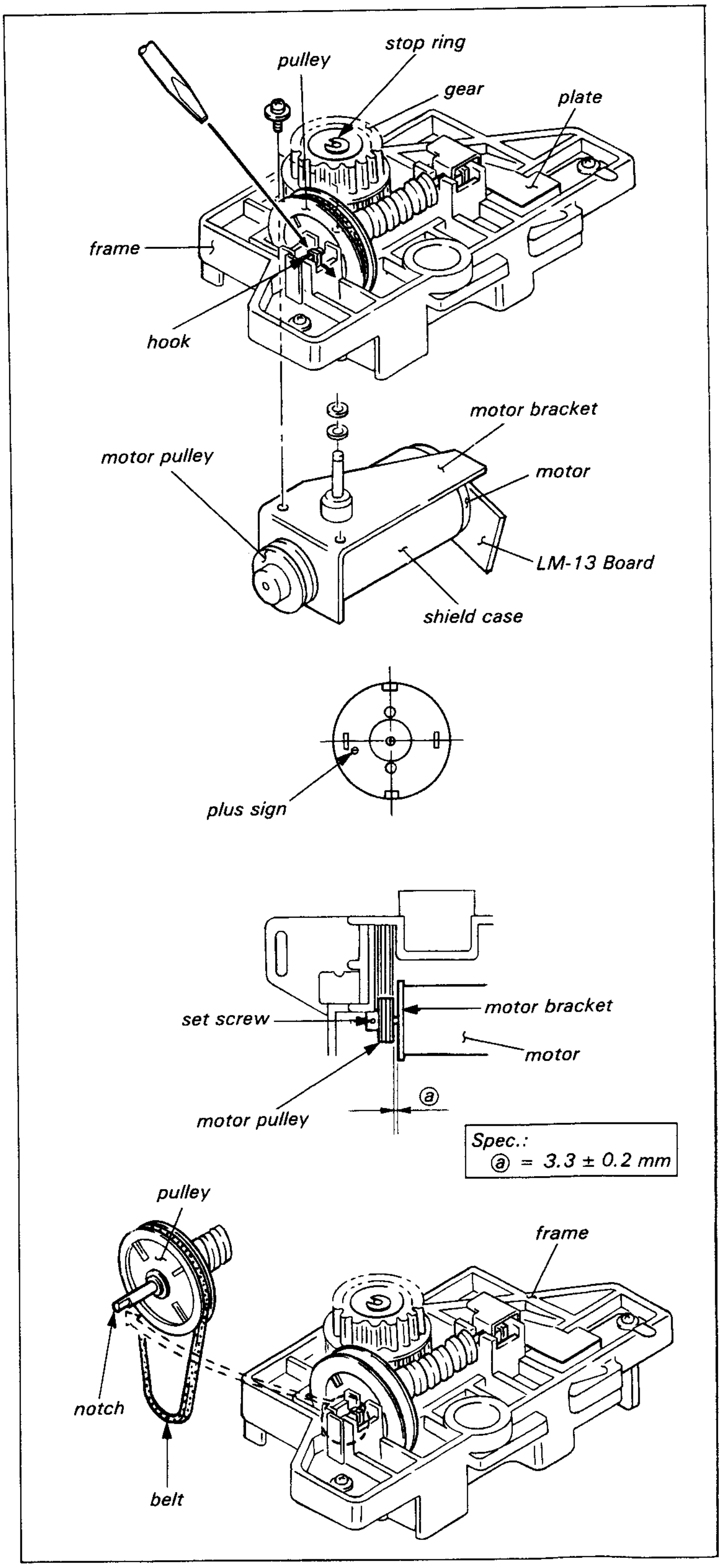
(10) Install the shield case to the motor.

(11) Install the motor to the frame as shown in the figure. Peform steps (4) to (6) in reverse order. Check that the clearance between the motor pulley and the bracket meets the required specification.

(12) Hook the belt to the pulley and install the pulley on the frame. Be sure that the orientation of the notch of the pulley shaft is as shown in the figure.

(13) Hook the belt to the motor pulley. Check that the belt is not twisted.

(14) Check as described in Section 4-11.


stop ring
pulley
gear
plate
frame
hook
motor bracket
motor pulley
motor
LM-13 Board
shield case
plus sign
set screw
motor bracket
motor
motor pulley
ⓐ
Spec.:
ⓐ = 3.3 ± 0.2 mm
pulley
frame
notch
belt

4-10-3. Replacement of the Threading Belt

Replacement procedure:

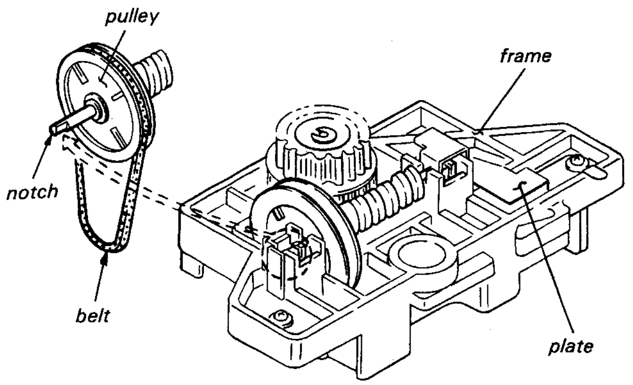
(1) Perform steps (1) to (3) in Section 4-10-2, Replacement of the Threading Motor.

(2) Clean the new belt and the groove of the pulley with a cloth moistened with cleaning fluid.

(3) Hook the belt to the pulley and install them to the frame. Be sure that the orientation of the notch of the pulley shaft is as shown in the figure.

(4) Install the plate to the frame and hook the belt to the Motor pulley. Check that the belt is not twisted.

(5) Check as described in Section 4-11.



4-11. ITEMS TO BE ADJUSTED AFTER MAIN PARTS REPLACEMENT

(Nambers in parenthesis refer to Section Nos.)

Replacement of Threading Ring

Threading Ring Rotation Adjustment (5-3-1) → Gear Box Position Adjustment (5-3-2) → FR Detector Block Mounting Position Adjustment (5-3-4) → Pinch Roller Position Adjustment (5-3-3) → Pinch Lever Pre-set Adjustment (5-4-1) → Pinch Roller Pre-set Adjustment (5-4-2) → Leaf Spring Position Adjustment (5-9) → F FWD/REW Modes Tape Path Adjustment (7-1) → T Correction Guide Slantness Adjustment (7-2) → Tape Path Adjustment Around Pinch Roller (7-6) → PLAY Mode Tape Path Adjustment (1) (7-3) → PLAY Mode Tape Path Adjustment (2) (7-4) → REV Mode Tape Path Adjustment (7-5) → Video Tracking Adjustment (7-7-1) → CTL PB Head Height/Azimuth/Zenith Adjustments (7-7-2) → Video Tracking Adjustment (check) (7-7-1)

Replacement of Pinch Roller

Pinch Roller Self Alignment Adjustment (5-3-3) → Pinch Roller Pre-set Adjustment (5-4-2) → → PLAY Mode Tape Path Adjustment (2) (7-4) → REV Mode Tape Path Adjustment (7-5) → → Tape Path Adjustment Around Pinch Roller (7-6) → Video Tracking Adjustment (check)(7-7-1)

Replacement of Take-up Reel Table

Reel Table Height and Vertical Play Adjustment (5-1-2) → T Brake Torque Adjustment (6-1-2) → REW Brake Torque Adjustment (6-1-3) → F FWD/REW Torque Adjustment (6-2) FWD Torque Adjustment (6-3) → F FWD/REW Modes Tape Path Adjustment (7-1)

Replacement of Supply Reel Table

Reel Table Height and Vertical Play Adjustment (5-1-2) → S Brake Torque Adjustment (6-1-1) → F FWD/REW Torque Adjustment (6-2) → REV Torque Adjustment (6-4) → FF Back Tension Adjustment (6-5) → FWD Back Tension Adjustment (6-6) → Video Tracking Adjustment (check) (7-7-1)

Replacement of Brake Band

FF Back Tension Adjustment (6-5) → FWD Back Tension Adjustment (6-6)

Replacement of Capstan Motor

Pinch Lever Right Angle Adjustment (5-10) → Pinch Roller Self Alignment Adjustment (5-3-3) → Capstan Search Speed Adjustment → Capstan FWD/REV Detector Adjustment → Capstan Free Speed Adjustment → Capstan Stop Servo Adjustment → PLAY Mode Tape Path Adjustment (2) (7-4) → REV Mode Tape Path Adjustment (7-5) → Tape Path Adjustment Around Pinch Roller (7-6) → Video Tracking Adjustment (check)(7-7-1)

Replacement of Threading Motor

Gear Box Position Adjustment (5-3-2)

Replacement of Reel Motor

FWD Torque Adjustment (6-3) → REV Torque Adjustment (6-4)

Replacement of CTL PB Head

CTL PB Head Height/AZimuth/Zenith Adjustments (7-7-2) → Video Tracking Adjustment (check) (7-7-1)

Replacement of Audio/CTL Head

Audio Head Height Adjustment (7-7-3) → Audio Head Azimuth Adjustment (7-7-5) → Video Tracking Adjustment (7-7-1) → Audio Head Height Adjustment (7-7-3) → Audio Head Azimuth Adjustment (7-7-5) → Audio Head Phase Adjustment (7-7-6) → Audio/CTL Head Position Adjustment (7-7-7) → Audio System Alignment (all of Section 10)

Replacement of Drum Assembly

Tracking Adjustment (7-7) → F FWD/REW Modes Tape Path Adjustment (7-1) → PLAY Mode Tape Path Adjustment (2) (7-4) → REV Mode Tape Path Adjustment (7-5) → Video Head Dihedral Adjustment (7-8) → Drum AFC Level Adjustment → Drum AFC Transient Adjustment → Switching Position Adjustment

Replacement of Upper Drum Assembly

Replacement of Upper Drum (4-1) → Tracking Adjustment (7-7) → F FWD/REW Modes Tape Path Adjustment (7-1) → PLAY Mode Tape Path Adjustment (2) (7-4) → REV Mode Tape Path Adjustment (7-5) → Video Head Dihedral Adjustment (7-8) → PB RF Amplifier Adjustment

SECTION 5
LINK AND DRIVE SYSTEM ALIGNMENT

5-1. REEL TABLE SYSTEM ADJUSTMENT

5-1-1. Cassette Holder Position Adjustment

Tool: Reel table height check base jig
Thickness gauge
L-shaped hexagonal wrench
(across flat has 1.27 mm)

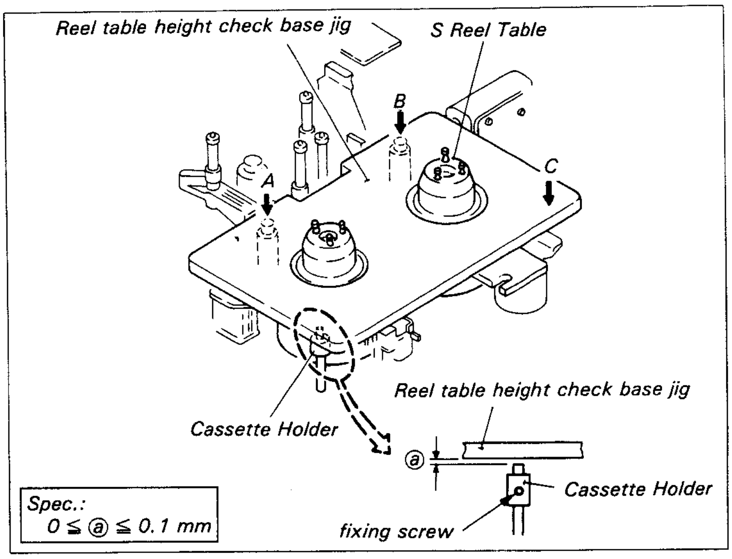
Mode: EJECT completion

Check procedure:

(1) While lightly pushing the Reel Table Height Check Base Jig marked (A), (B) and (C) toward the chassis, check that the clearance between the base jig and the cassette holder meets the required specification.

Adjustment procedure:

(1) Adjust the position of the Cassette Holder to meets the required specification.


Reel table height check base jig
S Reel Table
B
A
C
Cassette Holder
Reel table height check base jig
ⓐ
Cassette Holder
fixing screw

Spec.:
0 ≦ ⓐ ≦ 0.1 mm

5-1-2. Reel Table Height and Vertical Play Adjustment

- The height of the reel table is the reference for the tape threading system and the tape path system. This Adjustment should be performed very carefully.

Tool: Reel table height check base jig
Reel table height check jig
Slide vernier callipers or equivalent

Mode: EJECT completion

Check procedure:

(1) The probes of the Reel Table Height Check Jig marked "SO" and "TO" can slide over the reel table, leaving a clerarnce between the jig and the reel table. The probes marked "SX" and "TX" meet the flange and cannot slide over the reel table.
  - Use the "SO" and "SX" probes for the Supply Reel Table.
  - Use the "TO" and "TX" probes for the Take-up Reel Table.

(2) After tighten the fixing screw of the top of the reel table, push up and press down the reel table. Check that the vertical play meets the required specification.

Adjustment procedure:

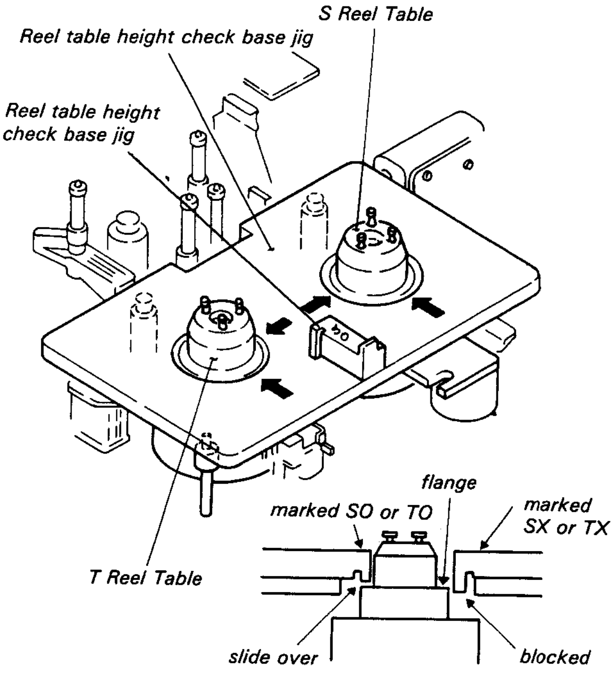
(1) Place the washer under the reel table and adjust the height of the reel table.

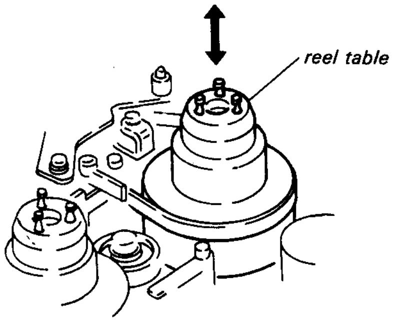
(2) Place the washer on the reel table and adjust the vertical play of the reel table.

NOTE : When the reel table is removed and its height is adjusted with a washer, drop a drop of Sony oil on the reel shaft. (A drop of Sony oil is the amount that is scooped by a 2 mm dia. twing as shown in the figure.)

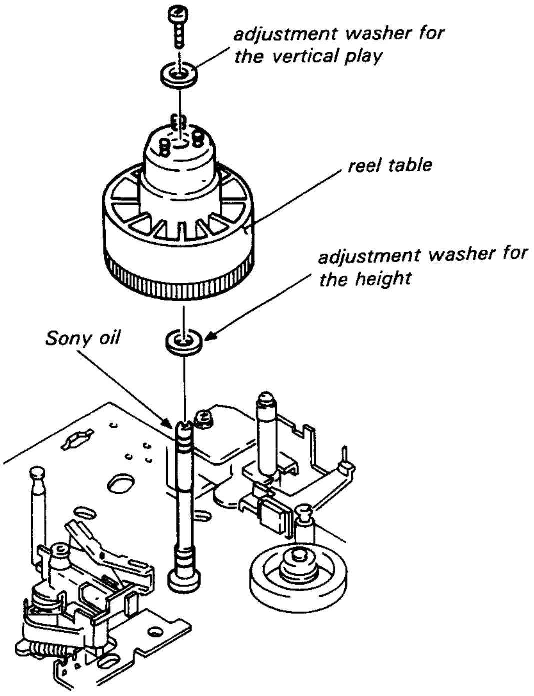
- Adjustment poly-slider washer:

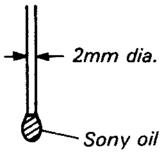
3-645-567-11	6 mm dia.	0.05 mm thick
3-701-444-01	6 mm dia.	0.13 mm thick
3-701-444-11	6 mm dia.	0.25 mm thick
3-701-444-21	6 mm dia.	0.5 mm thick


S Reel Table
Reel table height check base jig
Reel table height check base jig
flange
marked SO or TO
marked SX or TX
T Reel Table
slide over
blocked



Spec.: vertical play
0.17 mm ~ 0.38 mm


adjustment washer for the vertical play
reel table
adjustment washer for the height
Sony oil


2mm dia.
Sony oil

5-2. T DRAWER ARM ADJUSTMENT

5-2-1. T Drawer Arm EJECT Position Adjustment

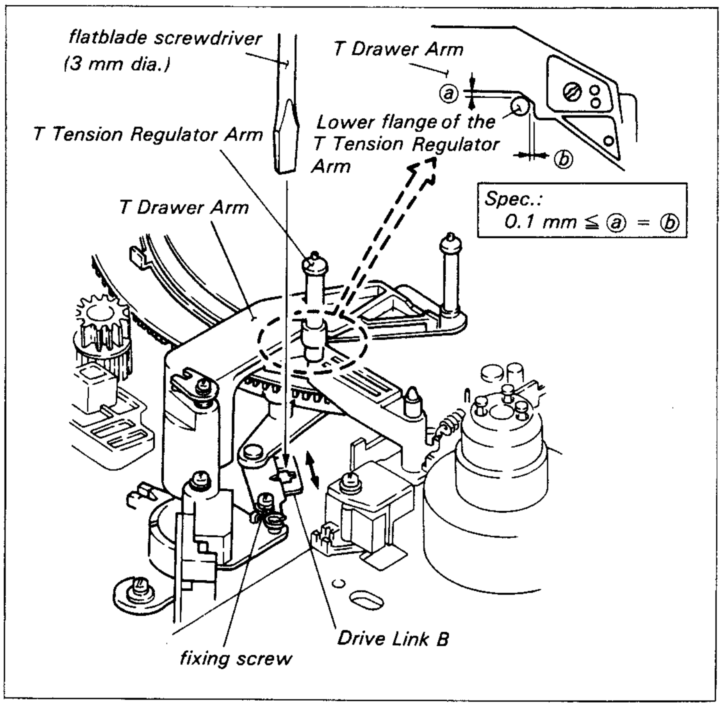
Mode: Put the unit into the FR-STOP mode without a cassette tape. And then put the unit inot the EJECT completion mode.

Check procedure:

(1) Check that the clearance between the lower flange of the T Tension Regulator Arm and the T Drawer Arm meets the required specification.

Adjustment procedure:

(1) Adjust the position of the Drive Link (B) Ass'y with a flatblade screwdriver (3mm dia.) to meets the required specification.


flatblade screwdriver
(3 mm dia.)
T Drawer Arm
ⓐ
Lower flange of the T Tension Regulator Arm
T Tension Regulator Arm
ⓑ
Spec.:
0.1 mm ≦ ⓐ = ⓑ
T Drawer Arm
Drive Link B
fixing screw

5-2-2. Unthread-end Switch Position Adjustment

Tool: Black vinyl tape
(1 cm x 1.5 cm)

Preparation:

(1) Put the unit into the FR-STOP mode and turn the power OFF.

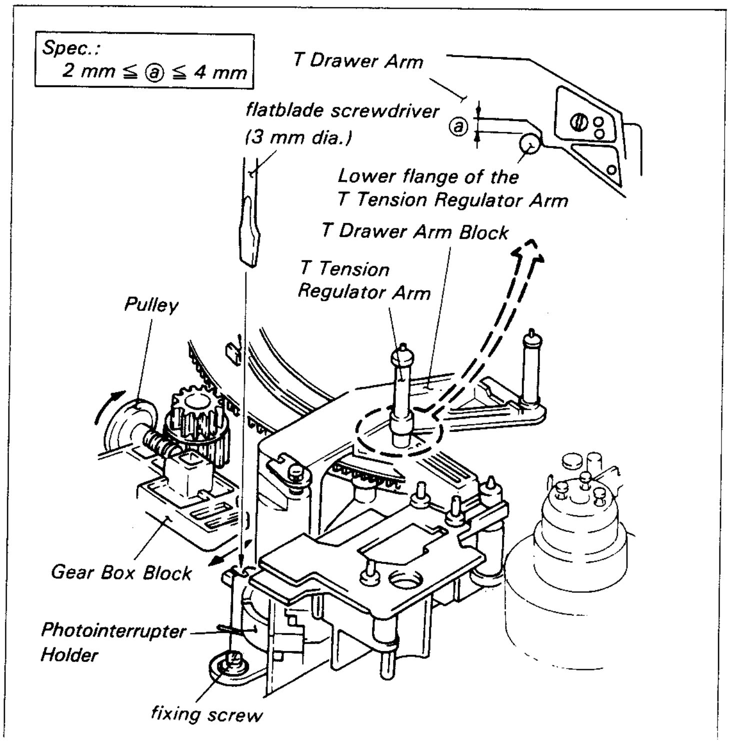
(2) Remove the Pinch Press Lever Spring from the bracket of the FR Detector Block with tweezers.

(3) Remove the FR Detector Block and cover the D2 photointerrupter (FR-UNTHREAD END Detector) with the black vinyl tape. (The FR Detector is put into the FR-STOP mode.)

Check procedure:

(1) Turn the power ON and rotate the pulley of Gear Box Block in the clockwise direction by hand.

(2) When the relationship of the T Drawer Arm and the T Tension Regulator Arm is as shown in the figure, check that the T Solenoid clicks.


Spec.:
2 mm ≦ ⓐ ≦ 4 mm
T Drawer Arm
flatblade screwdriver
(3 mm dia.)
ⓐ
Lower flange of the T Tension Regulator Arm
T Drawer Arm Block
T Tension Regulator Arm
Pulley
Gear Box Block
Photointerrupter Holder
fixing screw

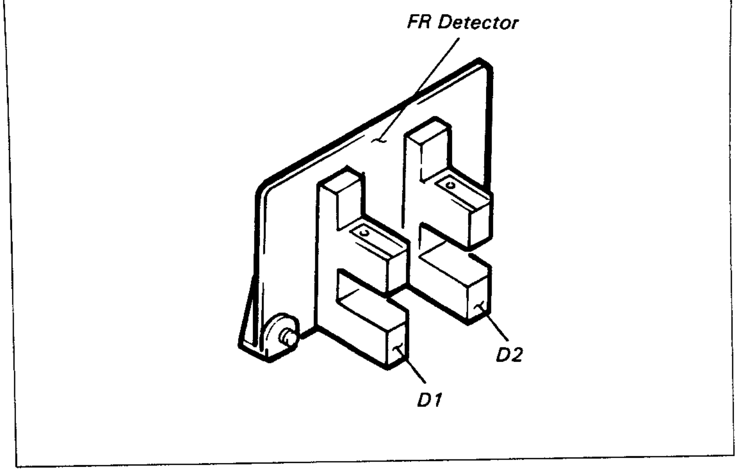
Adjustment procedure:

(1) Adjust the position of the Photointerrupter Holder with a flatblade screwdriver (3mm dia.) to meet the required specification.

(2) Turn the power OFF and install FR Detector Block after peeling off the black vinyl tape.

(3) Perform Section 5-3-4, FR Detector Installing Position Adjustment.

(4) Hook the Pinch Press Lever Spring to the bracket of the FR Detector Block with tweezers.



5-3. THREADING SYSTEM ADJUSTMENT

5-3-1. Threading Ring Rotation Adjustment

- This adjustment is required only when the Threading Ring is replaced or removed.
- If the Threading Ring is adjusted to have a narrower clearance, the ring rotation becomes sluggish. If adjusted to have a wider clearance, tape run during threading, FWD, and REV modes will be unstable.

Mode: Check mode: EJECT completion/
Threading/Unthreading
Adjustment mode: EJECT completion

Check procedure:

(1) Put the unit into the EJECT completion mode. Check that the horizontal play meets the required specification when the Thteading Ring is pushed in the direction of the arrow.

(2) Check that the rotation of the Threading Ring during the Threading and Unthreading modes is smooth.

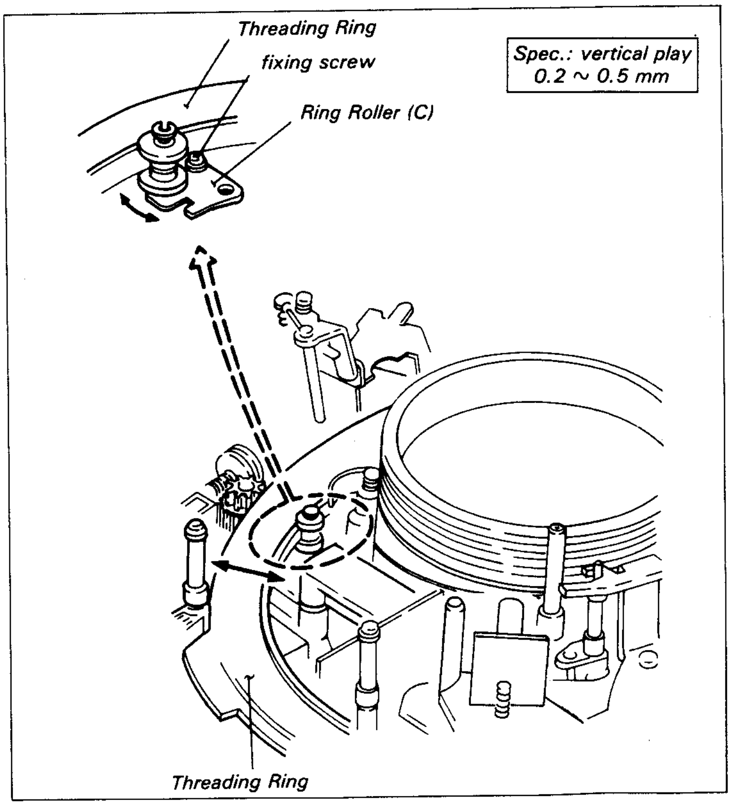
Adjustment procedure:

(1) Put the unit into the EJECT completion mode.

(2) Adjust the position of the Ring Roller (C) to meet the required specification.

Reference:

- Insert a 0.3 mm thick piece of paper between the Threading Ring and the Ring Roller (C).
- Three pages of this service manual are 0.3 mm thick.



5-3-2. Gear Box Installing Position Adjustment

- It is required that Section 5-3-1, Threading Ring Rotation Adjustment is correct before initiating this adjustment.

Mode: Put the unit into the EJECT completion mode. Turn the pulley of the Gear Box 1/2 to 1 turn in the direction of arrow C.

Check procedure:

(1) Put the unit into the EJECT completion mode and then turn the pulley of the Gear Box 1/2 to 1 turn in the direction of arrow C.

(2) Mark two lines on the top surface of the gear with a black felt tip pen. (Two lines are easy to see during the adjustment.)

(3) Turn the pulley in the direction of arrow C or D until one of the lines is roughly parallel to the outer circumference of the Threading Ring.

(4) Check that the relationship between the outer circumference of the Threading Ring and the Gear meets the required specification.

Adjustment procedure:

(1) Open the SY-106A Board.

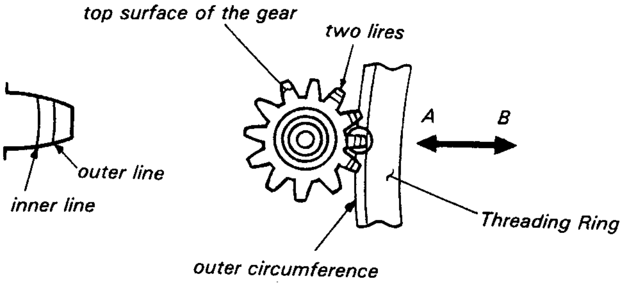
(2) Turn the pulley in the direction of arrow C or D until one of the lines is roughly parallel to the outer circumference of the Threading Ring.

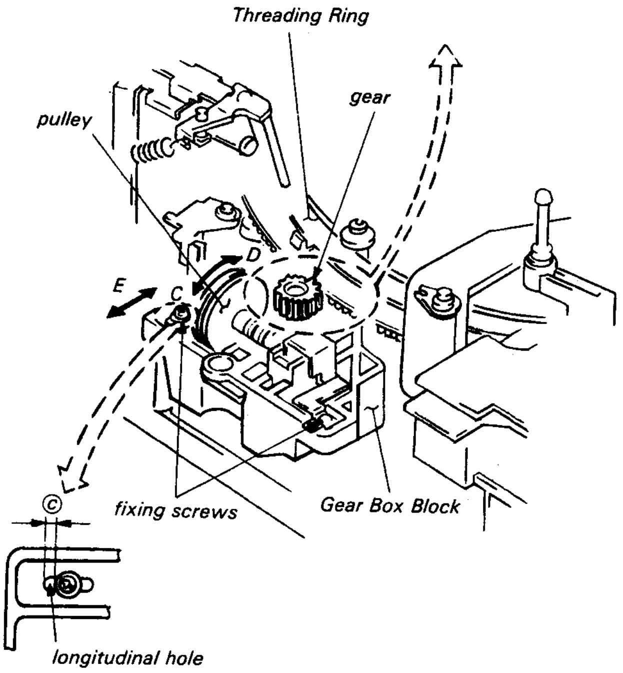
(3) Move the Gear Box in the direction of arrow E to meet the required specification.

(4) Check that Section 6-5-1, Threading Ring Rotation Adjustment meets the required specification.

(5) Check that © meets the required specification at the longitudinal hole of the gear block as shown in the figure.

Spec.:
(1) When pushing the Threading Ring in the direction of arrow A or B, the outer circumference of the Threading Ring is between two lines of the gear.


top surface of the gear
two lires
A
B
outer line
inner line
Threading Ring
outer circumference


Threading Ring
gear
pulley
D
E
C
©
fixing screws
Gear Box Block
longitudinal hole

Spec.:
0.1 mm ≦ © ≦ 1.5 mm

5-3-3. Pinch Roller Self Alignment Adjustment

- If this adjustment is incorrect, the position and the slantness of the Pinch Roller will not be correct when the Pinch Roller is pressed against the Capstan Shaft. Incorrect adjustment will cause a tape to be damaged.

Mode: PLAY mode without a cassette tape

Check procedure:

(1) Put the unit into the PLAY mode without a cassette tape.

(2) Check that the relationship of Pinch Roller Arm (A) and Pinch Roller Arm (B) meets the required specification.

Adjustment procedure:

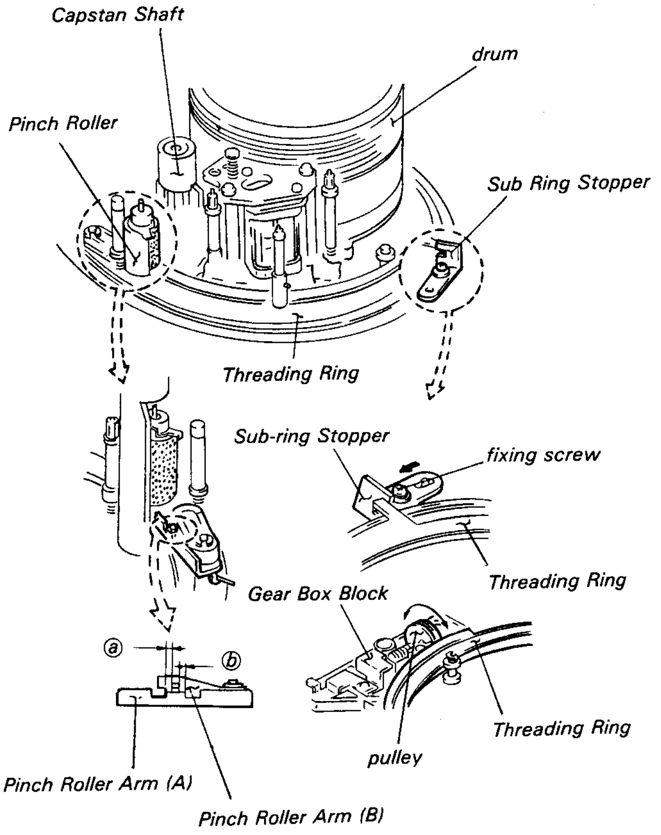
(1) Put the unit into the PLAY mode without a cassette tape.

(2) Loosen the fixing screw in the Sub-ring Stopper.

(3) Turn the pulley of the Gear Box Block in the direction of the arrow to meet the required specification.

(4) Push the Sub-ring Stopper gently in the direction of the arrow and tighten the fixing screw.

(5) Put the unit into the EJECT completion mode and then perfomn the check procedure.


Capstan Shaft
drum
Pinch Roller
Sub Ring Stopper
Threading Ring
Sub-ring Stopper
fixing screw
Threading Ring
Gear Box Block
ⓐ
ⓑ
Threading Ring
pulley
Pinch Roller Arm (A)
Pinch Roller Arm (B)

Spec.:
There are clearances ⓐ and ⓑ.

5-3-4. FR Detector Block Installing Position Adjustment

. It is required that the Section 5-3-1, Threading Ring Rotation Adjustment is correct before initiating this adjustment.

Mode: Threading completion mode

Adjustment procedure:

(1) Put the unit into the Threading completion mode and turn the power OFF.

(2) Remove the Pinch Press Lever Spring from the bracket of the FR Detector Block with tweezers.

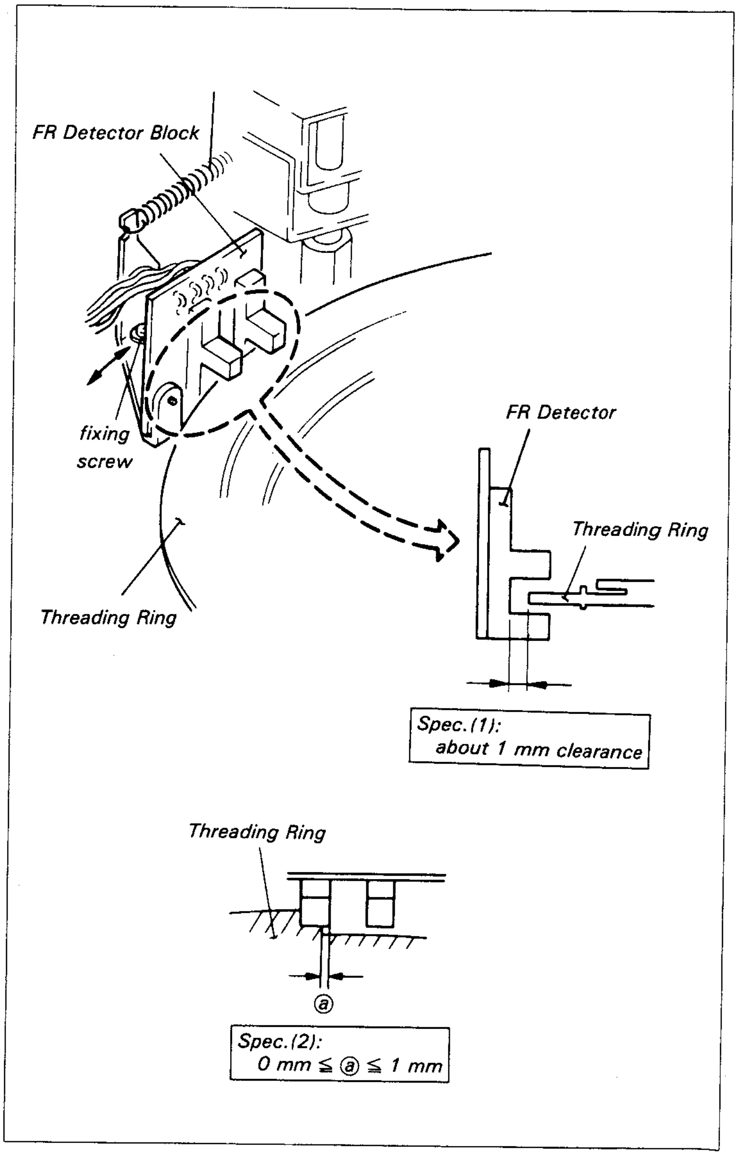
(3) Loosen the fixing screw of the FR Detector block 1/4 to 1/2 turn.

(4) Press the FR Detector Block against the Threading Ring, and reverse it about 1mm. (Do not reverse it more than 1.5mm) (Spec.1)

(5) Move the FR Detector Block in the direction of the arrow to meet the required specification 2.

(6) Check that the clearance meets the required specification 1.

(7) Hook the Pinch Press Lever Spring to the bracket of the FR Detector Block with tweezers.


FR Detector Block
fixing screw
Threading Ring
FR Detector
Threading Ring
Spec.(1):
about 1 mm clearance
Threading Ring
ⓐ
Spec.(2):
0 mm ≦ ⓐ ≦ 1 mm

5-4. PINCH LEVER BLOCK ADJUSTMENT

5-4-1. Pinch Lever Preset Adjustment

- It is required that Section 5-3-1, Threading Ring Rotation Adjustment and Section 6-3-3, Pinch Roller Self Alignment Adjustment are correct before initiating this adjustment.

Mode: Turn the power OFF in the PLAY mode

Check procedure:

(1) Put the unit into the PLAY mode and turn the power OFF. Check that the position of the Pinch Solenoid Pin meets the required specification.

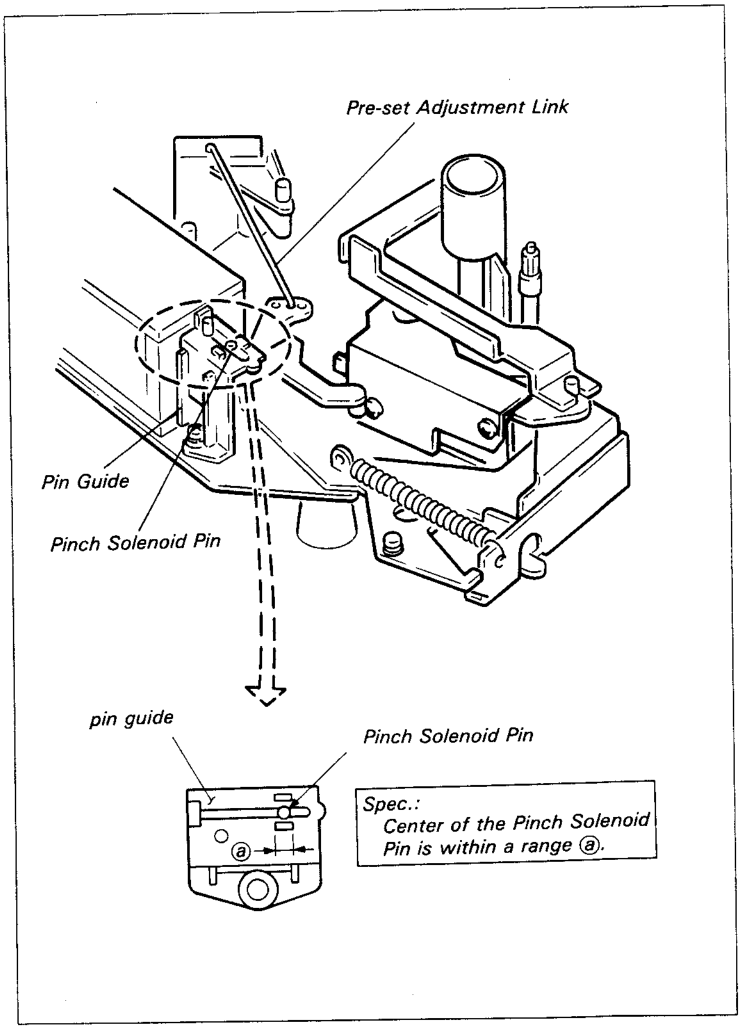
(2) Turn the power ON and press the PLAY button. After unthreading is complete, check as described in step (1).

Adjustment procedure:

(1) Adjust the position of the Pinch Solenoid to meet the required specification, refering to Section 5-7-4, Pinch Solenoid Installing Position Adjustment.

(2) If the specification in Step (1) cannot be obtained, adjust the position of the Sub-ring Stopper to meet the required specification, refering to Section 5-3-3, Pinch Roller Self Alignment Adjustment.

(3) If the specification in Steps (1) and (2) cannot be obtained, insert the Pinch Lever Preset Adjustment Link into the appropriate hole of the Preset Lever Ass'y to meet the required specification. Perform Steps (1) and (2) again.



Spec.:
Center of the Pinch Solenoid Pin is within a range ⓐ.

5-4-2. Pinch Roller Preset Adjustment

It is required that Section 5-3-1, Threading Ring Rotation Adjustment and Section 5-3-3, Pinch Roller Self Alignment Adjustment are correct before initiating this adjustment.

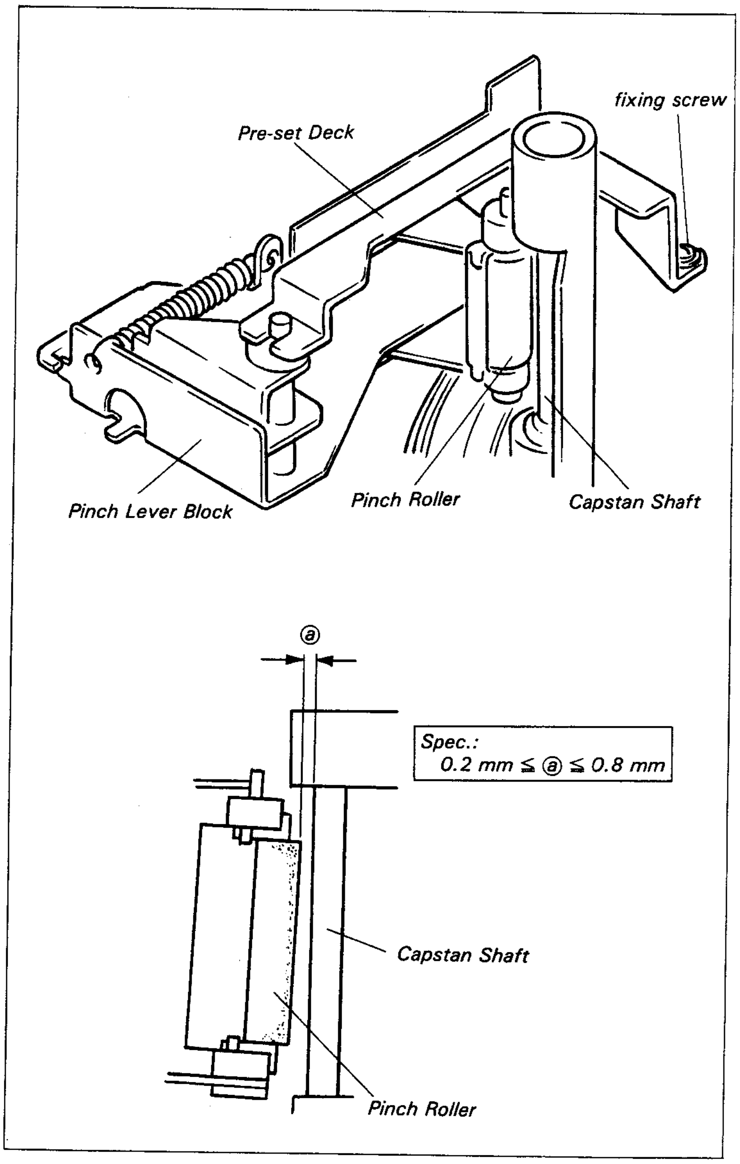
Tool: Thickness gauge
Mode: PLAY mode
Check procedure:

(1) Check that the clearance between the Pinch Roller and Capstan Shaft meets the required specification.

Adjustment procedure:

(1) Adjust the position of the Pre-set Deck to meet the required specification.

(2) Repeat the Threadihg/Unthreading modes two or three times and check that it meet the required specification.


Pre-set Deck
fixing screw
Pinch Lever Block
Pinch Roller
Capstan Shaft
ⓐ
Spec.:
0.2 mm ≦ ⓐ ≦ 0.8 mm
Capstan Shaft
Pinch Roller

5-4-3. Pinch Solenoid Block Position Adjustment

Tool: Thickness gauge

Mode: PLAY mode with a cassette tape

Check procedure:

(1) Insert a cassette tape and put the unit into the PLAY mode.

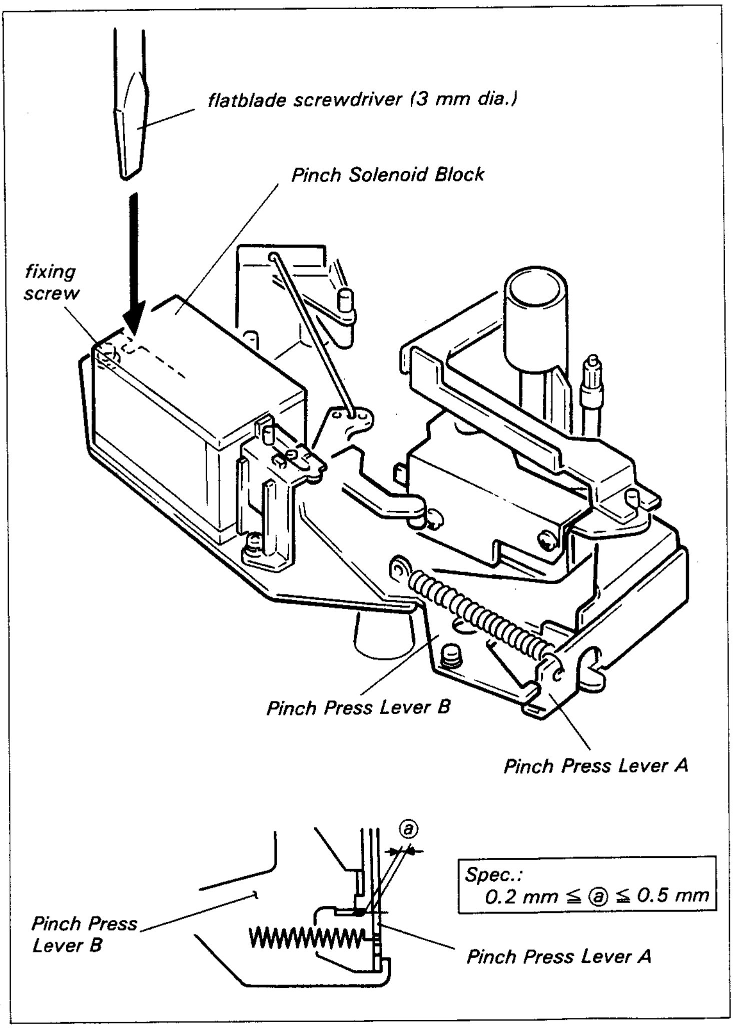
(2) Check that the clearance between Pinch Press Lever A and B meets the required specification.

(3) Repeat the Unthreading/Threading modes two or three times and check as described in step (2).

Adjustment procedure:

(1) Put the unit into the PLAY mode. Adjust the position of the Pinch Solenoid Block with a flatblade screwdriver (3 mm dia.) to meet the required specification.

(2) Perfom the check procedures (2) and (3).


flatblade screwdriver (3 mm dia.)
Pinch Solenoid Block
fixing screw
Pinch Press Lever B
Pinch Press Lever A
ⓐ
Spec.:
0.2 mm ≦ ⓐ ≦ 0.5 mm
Pinch Press Lever B
Pinch Press Lever A

5-5. T TAPE SENSOR POSITION ADJUSTMENT

- There are two adjustments in this section. The first is the height adjustment and the second is the adjustment of the clearance between the tape and LED.

Tool: Thickness gauge

Mode: PLAY and FR STOP modes with a cassette tape

Check procedure:

(1) Inset the cassette tape and put the unit into the FR STOP mode. Push the tape by hand as shown in the figure. Check that the clearance between top edge of the tape and bottom side of the T Photo Holder Block (black plastic) meets the required specification. (Spec. (1))

(2) Put the unit into the PLAY mode.

(3) As viewed from the top of the unit, check that the ※※ of the T Tape Sensor Block is above the upper flange of the T Drawer Arm (within the range "A"). (Spec. (2))

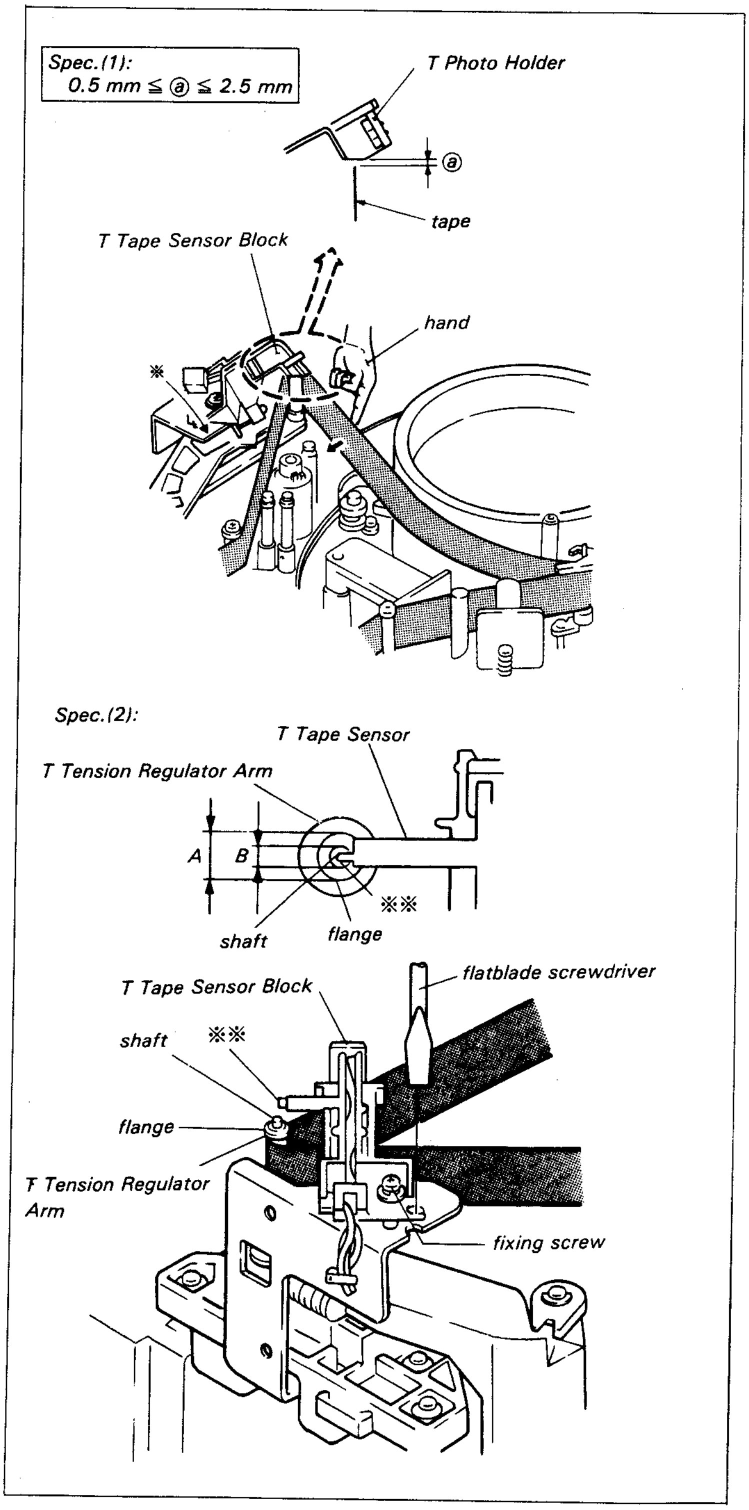
Adjustment procedure:

(1) Bend the ※ with a pliers to meet the required specification (1). Perfom check procedures (2) and (3).

(2) Loosen the fixing screw of the T Tape Sensor Block 1/2 to 1 turn.

(3) As viewed from the top of the unit in the PLAY mode, adjust the position of the T Tape Sensor Block with a flatblade screwdriver so that the ※※ of the T Tape Sensor Block is above the shaft of the T Drawer Arm (within the range "B").

(4) Check that it meets the required specification (1).


Spec.(1):
0.5 mm ≦ ⓐ ≦ 2.5 mm
T Photo Holder
ⓐ
tape
T Tape Sensor Block
hand
※
Spec.(2):
T Tape Sensor
T Tension Regulator Arm
A
B
※※
shaft
flange
T Tape Sensor Block
flatblade screwdriver
shaft
※※
flange
T Tension Regulator Arm
fixing screw

5-6. TENSION ARM SYSTEM ADJUSTMENT

5-6-1. S Drawer Roller Block Limiter Adjustment

Mode: FR-STOP mode

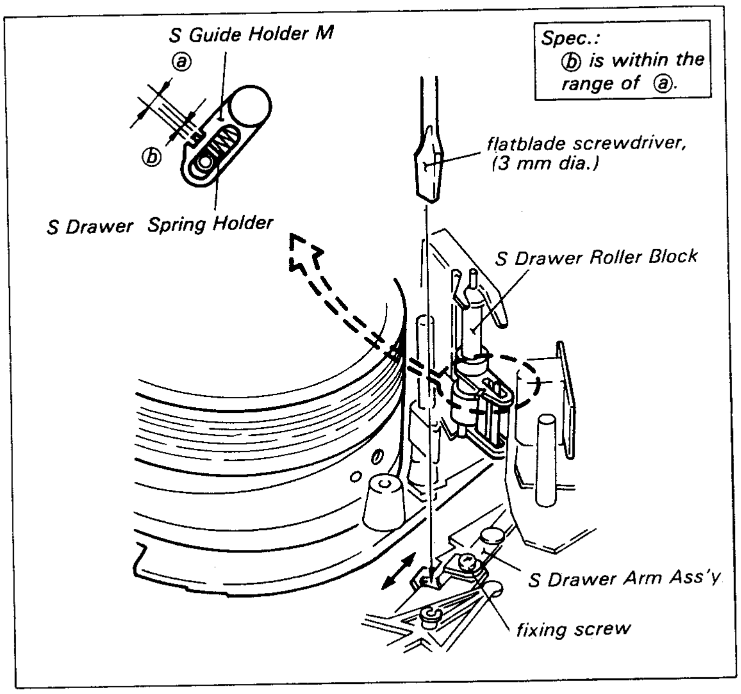
Check procedure:

(1) Check that " b " of the S Drawer Spring Holder in the S Drawer Roller Block fits into notch " a " of the S Guide Holder M.

Adjustment procedure:

(1) Loosen the fixing screw of the S Drawer Arm Ass'y 1/4 to 1/2 turn.

(2) Adjust the position of the S Drawer Arm Ass'y with a flatblade screwdriver (3 mm dia.) to meet the required specification.


S Guide Holder M
ⓐ
ⓑ
S Drawer Spring Holder
Spec.:
ⓑ is within the range of ⓐ.
flatblade screwdriver, (3 mm dia.)
S Drawer Roller Block
S Drawer Arm Ass'y
fixing screw

5-6-2. T Tension Regulator Operatiing Position Adjustment

Mode: FR-STOP mode

Tool: Thickness gauge

Check procedure:

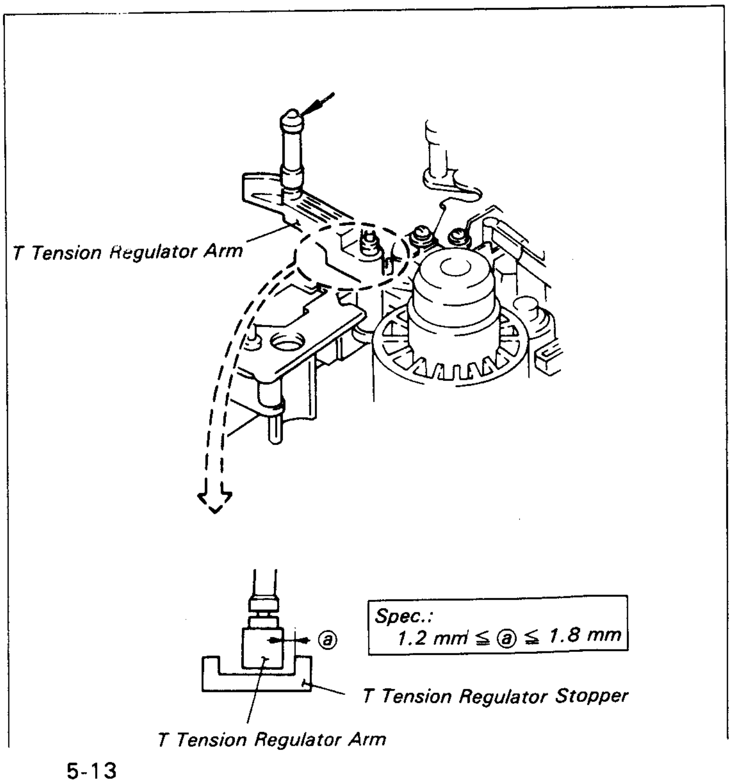
(1) Push the T Tension Regulator Arm in the direction of the arrow and remove the finger gently.

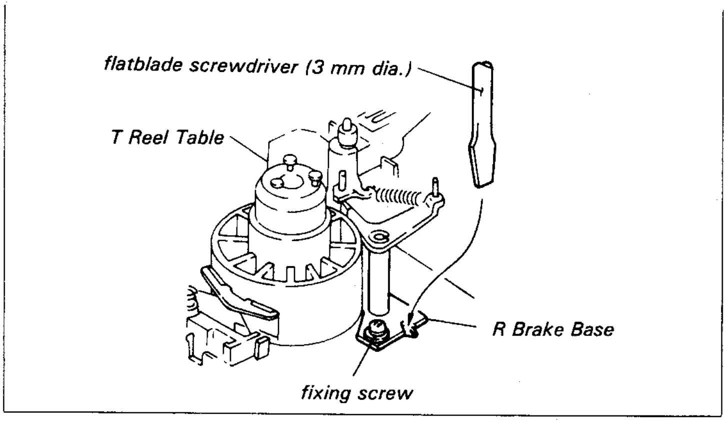
(2) Check that the clearance between the T Tension Regulator Arm and the stopper meets the required specification.

Adjustment procedure:

(1) Loosen the fixing screw of the R Brake Base 1/4 to 1/2 turn.

(2) Adjust the position of the R Brake Base with a flatblade screwdriver (3mm dia.) to meet the required specification.


T Tension Regulator Arm
ⓐ
Spec.:
1.2 mm ≦ ⓐ ≦ 1.8 mm
T Tension Regulator Stopper
T Tension Regulator Arm


flatblade screwdriver (3 mm dia.)
T Reel Table
R Brake Base
fixing screw

5-6-3. S Tension Regulator Operating Position Adjustment

Mode: FF mode

Check procedure:

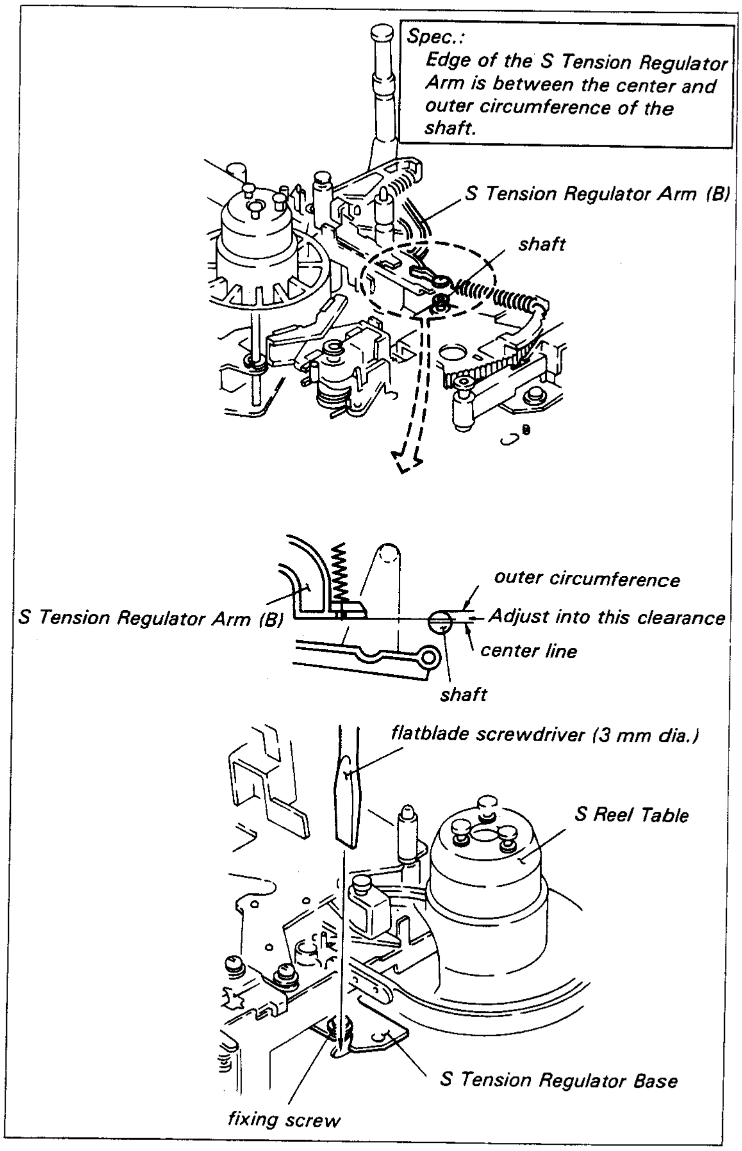
(1) Put the unit into the FF mode without a cassette tape.

(2) Check that the edge of the S Tension Regulator Arm (B) meets the required specification.

Adjustment procedure:

(1) Loosen the fixing screw of the S Tension Regurator Base 1/4 to 1/2 turn.

(2) Adjust the position of the S Tension Regulator Base to meet the required specification.


Spec.:
Edge of the S Tension Regulator Arm is between the center and outer circumference of the shaft.

S Tension Regulator Arm (B)
shaft
outer circumference
S Tension Regulator Arm (B)
Adjust into this clearance
center line
shaft
flatblade screwdriver (3 mm dia.)
S Reel Table
S Tension Regulator Base
fixing screw

5-6-4. Tension Detector Position Adjustment

Tool: DC voltmeter

Mode: FWD / REV mode

Preparation:

(1) Connect the dc voltmeter to TP1 on the SY-106A Board.

Check procedure:

(1) Put the unit into the FWD mode without a cassette tape.

(2) Push the T Tension Regulator Arm to the right with a hand as far as it will go. Check that the dc voltage is more than 8V.

(3) Push the T Tension Regulator Arm to the left with a hand as far as it will go. Check that the dc voltage is less than 2.5V.

(4) Put the unit inti the REV mode.

(5) Push the S Tension Regulator to the right with a hand as far as it will go. Check that the dc voltage is less than 2.5 V.

(6) Push the S Tension Regulator to the left with a hand as for as it will go. Check that the dc voltage is more than 8 V.

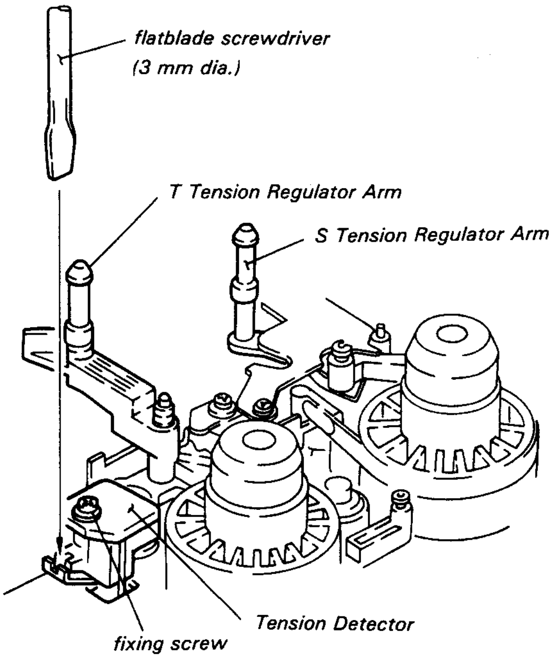
Adjustment procidure:

(1) Remove the FR Detector Block from the unit.

(2) Loosen the fixing screw of the Tension Dtetctor 1/4 to 1/2 turn.

(3) Insert a flatblade screwdriver (3 mm dia) in the notch and adjust the position of the Tension Detector to meet the required specification.

(4) After adjustment, install the FR Detector.



5-6-5. T Tension Regulator Arm Height Adjustment

Tool: L-shaped hexagonal wrench
(across flat has 1.5 mm)

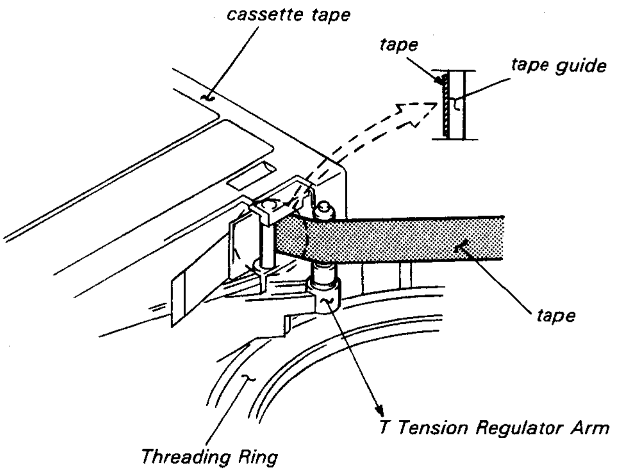
Mode: PLAY / F FWD mode with a cassette tape

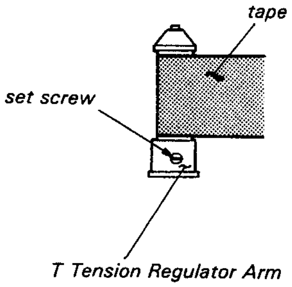
Check procedure:

(1) Insert a cassette tape and put the unit into the PLAY mode.
(2) Check that the tape runs in the middle of the tape guide in the cassette.
(3) Check that the tape runs in the middle of the T Tension Detector Guide.
(4) Put the unit into the F FWD mode.
(5) Check as described in steps (2) and (3).

Adjustment procedure:

(1) Loosen the set screw at the lower flange of the T Tension Regulator Arm.
(2) Adjust the height of the T Tension Regulator Arm to meet the required specification.


cassette tape
tape
tape guide
tape
T Tension Regulator Arm
Threading Ring


tape
set screw
T Tension Regulator Arm

5-7. SEARCH SOLENOID SYSTEM ADJUSTMENT

5-7-1. Search Solenoid Installing Position Adjustment

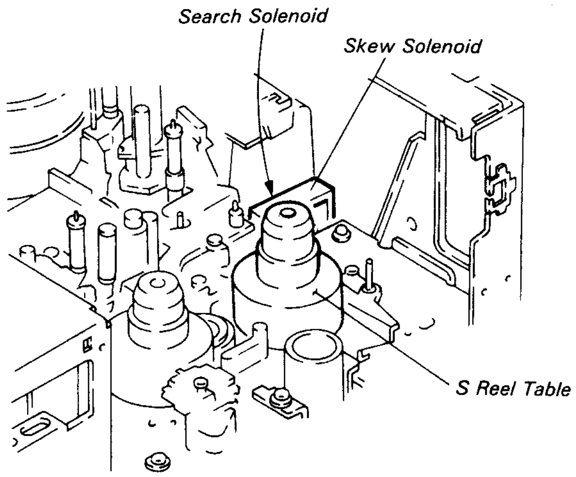
- This adjusment is required only when the search solenoid is replaced or removed.

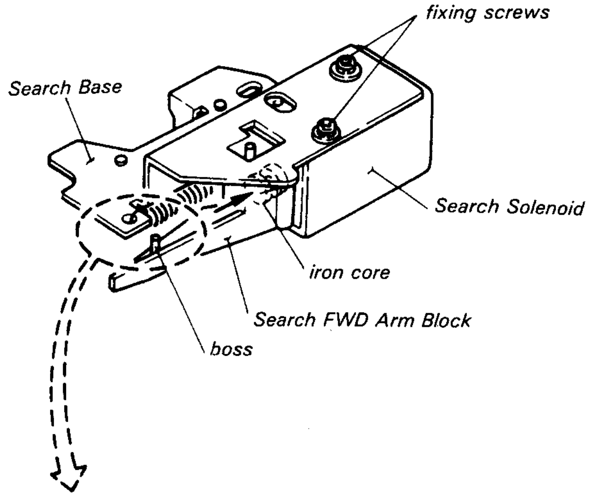
Preparation:

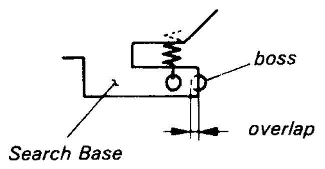
(1) Remove the Search Solenoid Block from the chassis.

Adjustment procedure:

(1) Move the iron core into the fully energized position (as far as it will go in the direction of the arrow). Adjust the position of the Search Solenoid so that the overlap of the Search FWD Arm Boss and the Search Base meets the required specification.


Search Solenoid
Skew Solenoid
S Reel Table


fixing screws
Search Base
Search Solenoid
iron core
Search FWD Arm Block
boss


boss
overlap
Search Base

Spec.:
0 mm ≦ ⓐ ≦ 1.0 mm

5-7-2. T Idler Solenoid Position Adjustment

- This adjustment is performed when T Idler Solenoid is replaced or removed, and the F FWD Torque does not meet the required specification.

Mode: F.FWD mode without a cassette tape

Adjustment procedure:

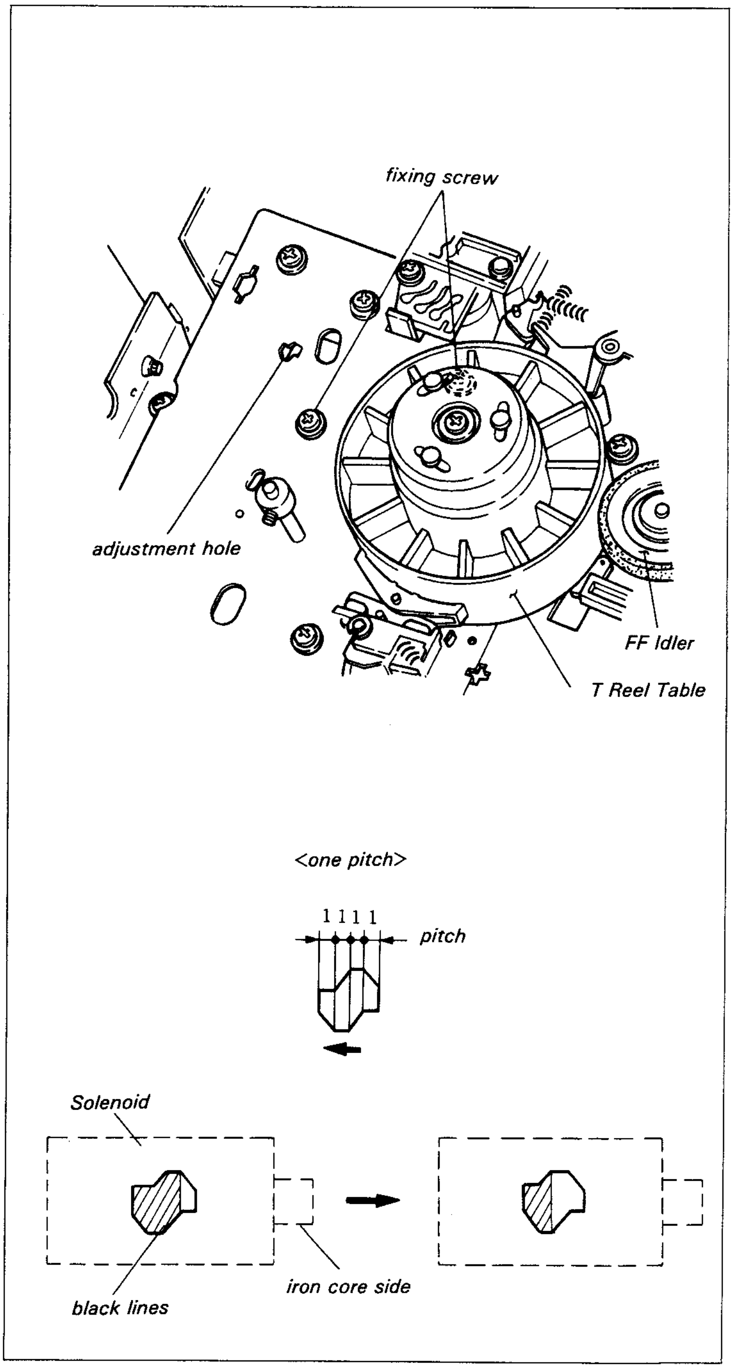
(1) Put the unit into the F FWD mode without a cassette tape.

(2) Loosen the fixing screws of the T Idler Solenoid about 1/2 turn.

(3) Adjust the position of the T Idler Solenoid until the clearance between the T Reel Table and FF Idler become 0.01 to 0.1 mm.

(4) Note the adjustment hole and check that the black line of the solenoid is in this hole.

(5) Move the Solenoid in the direction of the arrow only one pitch from the position of step (4). Tighten the fixing screws.


fixing screw
adjustment hole
FF Idler
T Reel Table
<one pitch>
1 1 1 1
pitch
Solenoid
black lines
iron core side

5-7-3. S Idler Solenoid Position Adjustment

- This adjustment is required only when the S Idler Solenoid is replaced or removed, and the REW Torque does not meet the required specification.

Mode: REW mode without a cassette tape

Adjustment procedure:

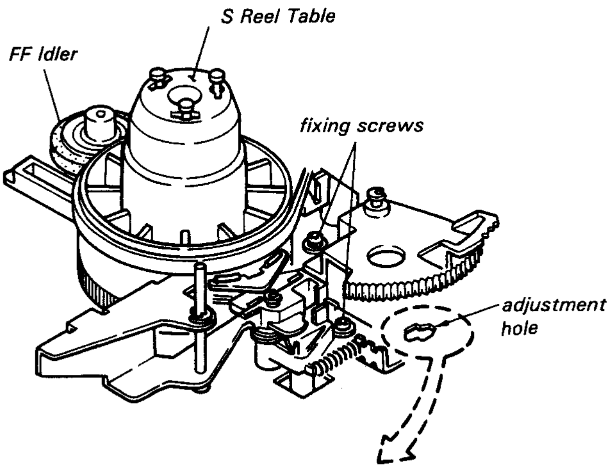
(1) Put the unit into the REW mode without a cassette tape.

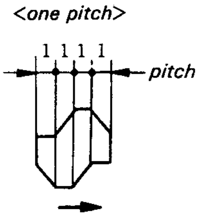
(2) Loosen the fixing screws of the S Idler Solenoid about 1/2 turn.

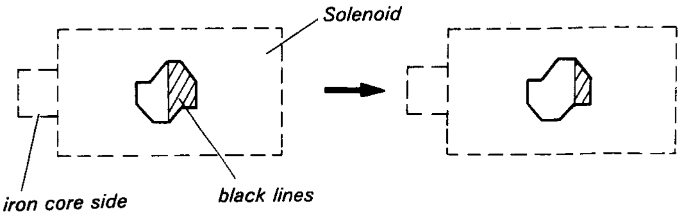
(3) Adjust the position of the S Idler Solenoid until the clerance between the S Reel Table and FF Idler become 0.01 to 0.1 mm.

(4) Note the adjustment hole and check that the black line of the solenoid is in this hole.

(5) Move the Solenoid in the direction of the arrow only one pitch from the position of step (4). Tighten the fixing screws.


S Reel Table
FF Idler
fixing screws
adjustment hole




Solenoid
iron core side
black lines

5-7-4. Pinch Solenoid Installing Position Adjustment

. This adjustment is required only when the Pinch Solenoid is replaced or removed.

Mode: PLAY mode with a cassette tape

Check procedure:

(1) Insert a cassette tape and put the unit into the PLAY mode.

(2) Check that the outer circumference of the Solenoid Pin meets the required specification.

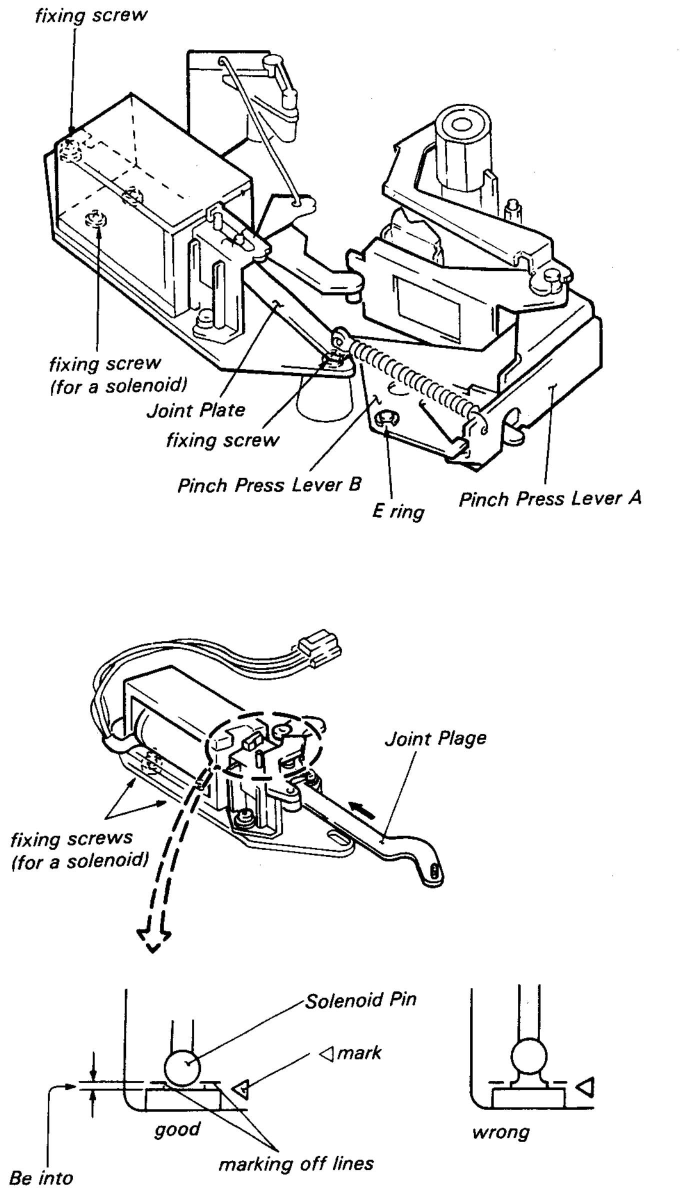
Adjustment procedure:

(1) Remove the E ring and the Joint Lever from the Pinch Press Lever B.

(2) Remove the Pinch Solenoid Block from the chassis after removing the two fixing screws.

(3) Move the Joint Lever to the fully energized position (as far as it will go in the direction of the arrow). Adjust the position of the solenoid so that the outer circumference of the Solenoid Pin to meet the required specification.

(4) Install the Pinch Solenoid Block on the unit. Perfom the check procedure.


fixing screw
fixing screw
(for a solenoid)
Joint Plate
fixing screw
Pinch Press Lever B
E ring
Pinch Press Lever A
Joint Plage
fixing screws
(for a solenoid)
Solenoid Pin
◁mark
good
wrong
marking off lines
Be into
this space.

Spec.:
Outer circumference of Solenoid Pin is between △ mark and marking off lines.

5-7-5. T Brake Solenoid Position Adjustment

Tool: Eccentric screwdriver (6 ϕ)

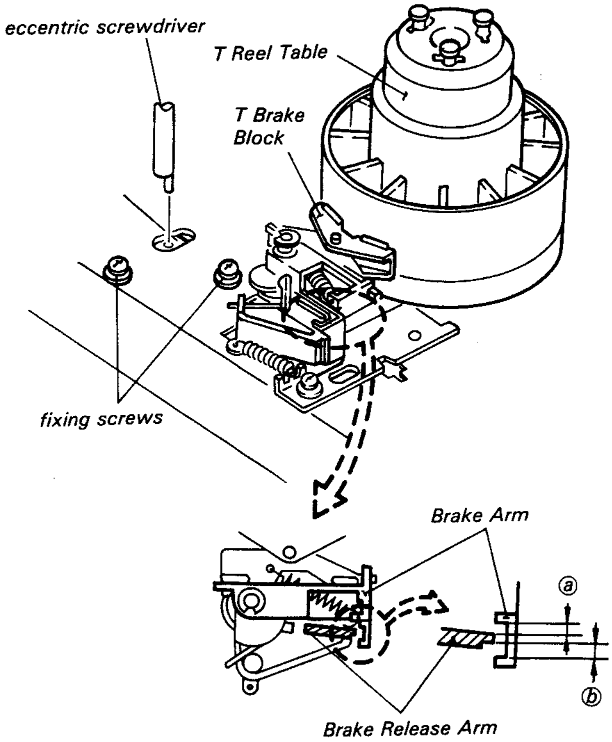
Mode: PLAY mode without a cassette tape

Check procedure:

(1) Check that the relationship between the Brake Release Arm and the Brake Arm meets the required specification.

Adjustment procedure:

(1) Adjust the position of the T Brake Solenoid with an eccentric screwdriver to meet the required specification.


eccentric screwdriver
T Reel Table
T Brake Block
fixing screws
Brake Arm
ⓐ
ⓑ
Brake Release Arm

Spec.:
There are clearances ⓐ and ⓑ.

5-7-6. S Brake Solenoid Position Adjustment

Tool: Eccentric screwdriver (6 φ)

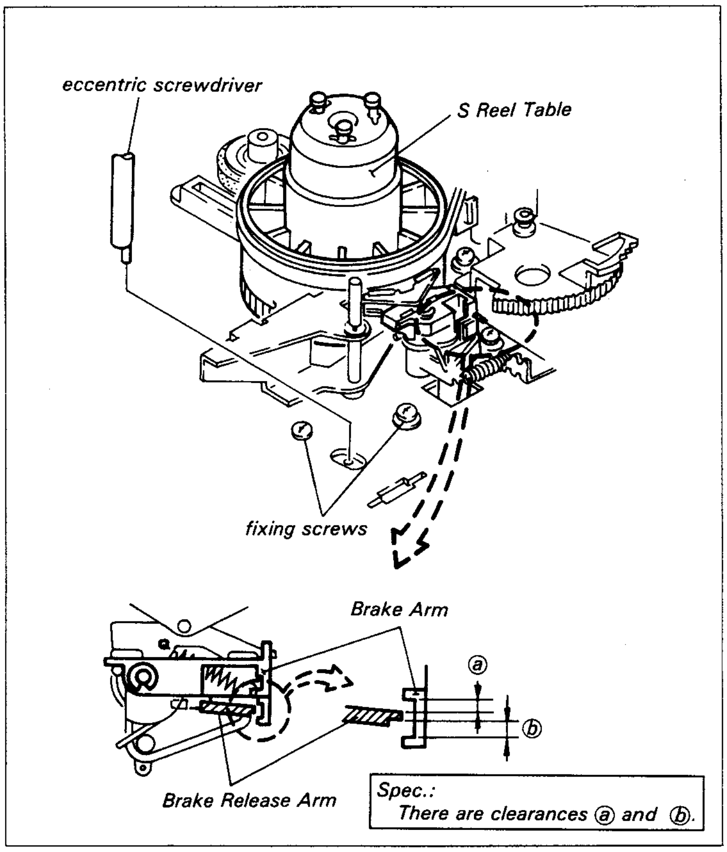
Mode: PLAY mode without a cassette tape

Check procedure:

(1) Check that the relationship between the Brake Release Arm and the Brake Arm meets the required specification.

Adjustment procedure:

(1) Adjust the position of the S Brake Solenoid with an eccentric screwdriver to meet the required specification.



eccentric screwdriver
S Reel Table
fixing screws
Brake Arm
ⓐ
ⓑ
Brake Release Arm

Spec.:
There are clearances ⓐ and ⓑ.

5-8. CASSETTE-UP COMPARTMENT ADJUSTMENT

- The Cassette-up Compartment has two photo-electric switches. The ON/OFF timing of these switches is adjusted in this procedures.
- Remove the Cassette-up Compartment from the unit for this adjustment.

5-8-1. Cassette-in Switch Position Adjustment

Tool: Circuit tester
Thickness gauge

Preparation:

(1) Connect jumpers from the harness plug for the Cassette-up Compartment to terminals on the CC-31 Board as follows:

plug of harness (CN1)	terminal on CC-31 Board
pin 4 (5V)◄	►pin 4/CN401
pin 5 or 2 (GND)◄	►pin 5 or 2/CN401

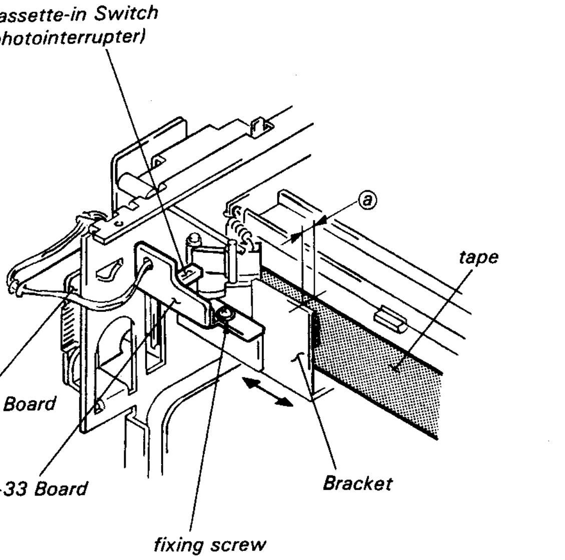
(2) Turn the power ON.

Check procedure:

(1) Connect the circuit tester to pin 1 (H; CASSETTE IN) of CN401 on the CC-31 Board.

(2) Slowly insert a KCA-60 type cassette tape.

(3) When the circuit tester indicates "H" (about 5V), check that the clearance between the front side of the cassette tape and the bracket of the Cassette- up Compartment meets the required specification.



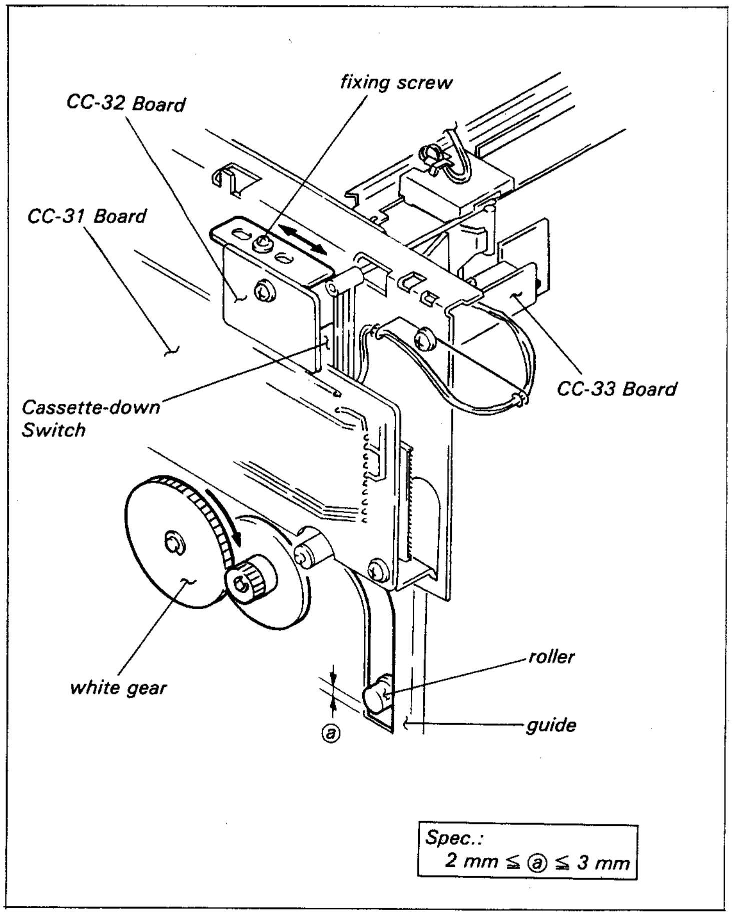
Spec.:
3 mm ≦ ⓐ ≦ 3.4 mm

Adjustment procedure:

(1) Move the Cassette-in Switch in the direction of the arrow to meet the required specification.

- Reference:
Insert a 3.3 mm thickness gauge between the cassette tape and the bracket. Adjust the position of the Cassette-in Switch until the circuit tester indicates to "H".

5-8-2. Cassette-down Switch Position Adjustment



Tool: Circuit tester

Preparation:

(1) Connect jumpers from the harness plug of the Cassette-up Compartment to terminal on the CC-31 Board as follows:

plug of harness (CN1)	terminal on CC-31 Board
pin 4 (5V)◄	►pin 4/CN401
pin 5 or 2 (GND)◄	►pin 5 of 2/CN401

(2) Turn the power ON.

Check procedure:

(1) Connect the circuit tester to pin 3 (H; CASSETTE DOWN) of CN401 on the CC-31 Board.

(2) Insert a KCA-60 type cassette tape and turn the white gear slowly in the direction of the arrow.

(3) When the circuit tester indicates "H", check that the clearance between the roller and the guide meets the required specification.

Adjustment procedure:

(1) Move the Cassette-down switch in the direction of the arrow to meet the required specification.

. Reference:

Turn the white gear on the right side until the clearance between the roller and the guide is 2.2 mm. Adjust the position of the Cassette-down Switch so that the circuit tester indicates "H" in this position.

5-9. LEAF SPRING POSITION ADJUSTMENT

Check procedure:

(1) Put the unit into the PLAY mode without a cassette tape and then put the unit into the EJECT mode.

(2) Turn the Gear Box Pulley by hand so that the edge of the T Drawer Arm is at the center of the shaft as shown in the figure.

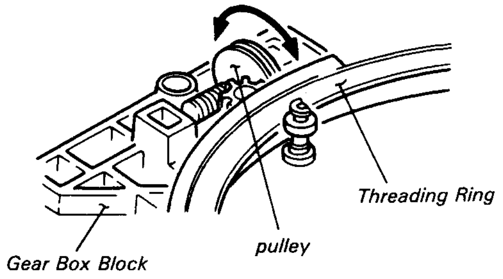
(3) Check that the clearance between the Leaf Spring and the Pinch Roller Shaft meets the required specificaiton (1).

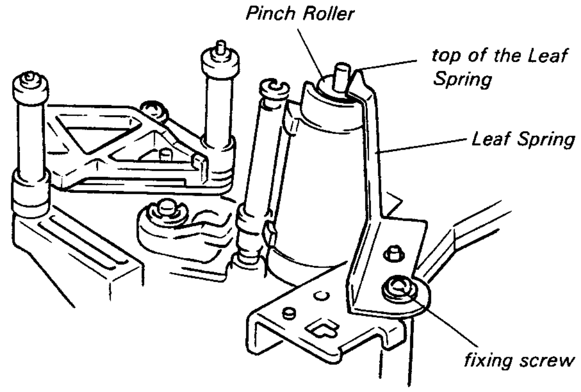
(4) Put the unit into the PLAY mode without a cassette tpae and then put the unit into the EJECT completion mode.

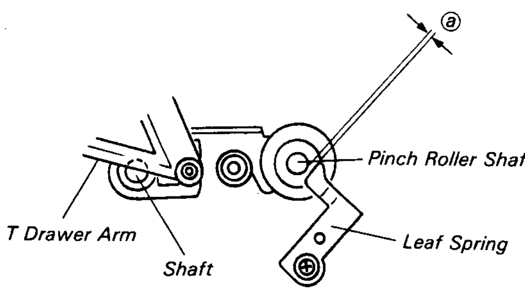
(5) Check that the Leaf Spring touches the Pinch Roller Shaft, and the clearance between the Leaf Spring and the Pinch Roller meets the required specification (2).

Adjustment procedure:

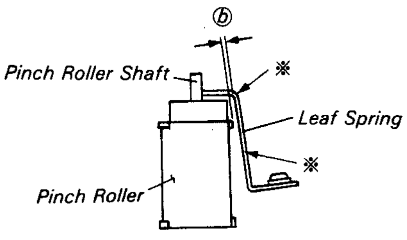
(1) Adjust the position of the Leaf Spring to meet the required specifications (1) and (2). If only specification (2) cannot be obtained, bend the ※ of the Leaf Spring to meet the required specification.


Threading Ring
Gear Box Block
pulley


Pinch Roller
top of the Leaf Spring
Leaf Spring
fixing screw


ⓐ
Pinch Roller Shaft
T Drawer Arm
Leaf Spring
Shaft

Spec.(1):
ⓐ ≦ 0.5 mm


ⓑ
Pinch Roller Shaft
※
Leaf Spring
※
Pinch Roller

Spec.(2):
There is a clearance ⓑ.

SECTION 6

BACK TENSION AND TORQUE ALIGNMENT

6-1. BRAKE SYSTEM ADJUSTMENT

6-1-1. S Brake Torque Adjustment

Tool: Reel table torque measurement tape (100 mm dia.)
Tension scale (200 g full scale)

Mode: EJECT completion / power OFF mode

Check procedure:

(1) Grasp the top of the S Reel Table. While turning it in the clockwise direction approx. 30 degrees, check that the clearance between the Brake Arm and the Lining Holder meets the required specification (1).

(2) Place the jig tape on the S Reel Table and hook a tension scale to the end of the jig tape. Pull out the tape at a constant speed of approx. 9.5cm/sec. in the direction of the arrow. Check that the scale reading meets the required specification (2).

Adjustment procedure:

For Spec. (1)

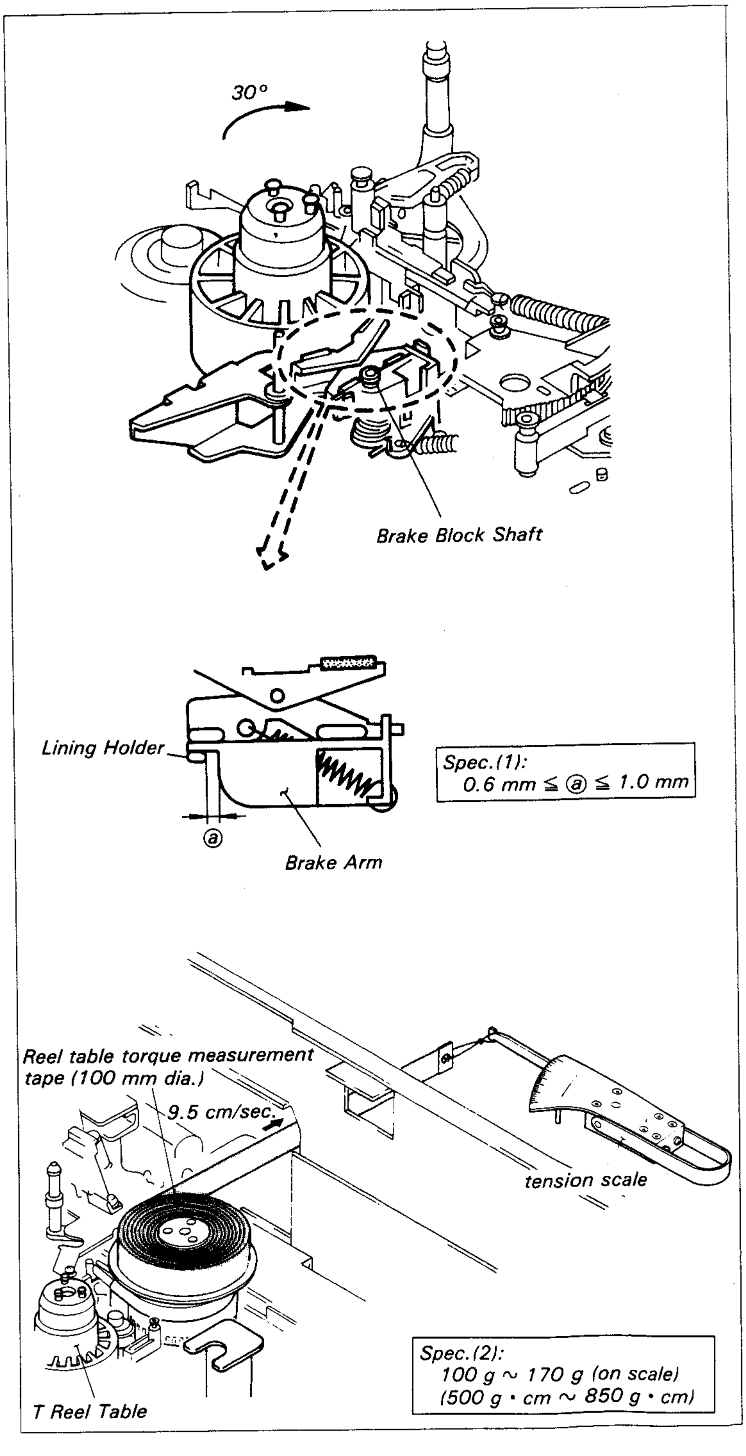
(1) Bend the Brake Block Shaft toward the reel table (or in the opposite direction) by hand.

For Spec. (2)

(2) Clean the surface of the reel table with a cloth moistened with cleaning fluid.

(3) If does not meet the specification (2), replace the Lining Holder and check again.

(4) If does not meet the specification in Step (3), replace the reel table and check again.


30°
Brake Block Shaft
Lining Holder
ⓐ
Brake Arm
Spec.(1):
0.6 mm ≦ ⓐ ≦ 1.0 mm
Reel table torque measurement tape (100 mm dia.)
9.5 cm/sec.
tension scale
T Reel Table
Spec.(2):
100 g ~ 170 g (on scale)
(500 g · cm ~ 850 g · cm)

6-1-2. T Brake Torque Adjustment

Tool: Reel table torque measurement tape
(100 mm dia.)
Tension scale (200 g full scale)

Mode: EJECT completion / power OFF mode

Check procedure:

(1) Grasp the top of the T Reel Table. While turning it in the clockwise direction approx. 30 degrees, check that the clearance between the Brake Arm and the Lining Holder meets the required specification (1).

(2) Place the jig tape on the T Reel Table and hook a tension scale to the end of the jig tape. While pushing the T Tension Regulator to the left, pull out the tape at a constant speed of approx. 9.5cm/sec. in the direction of the arrow. Check that the scale reading meets the required specification (2).

Adjustment procedure:

For Spec. (1)

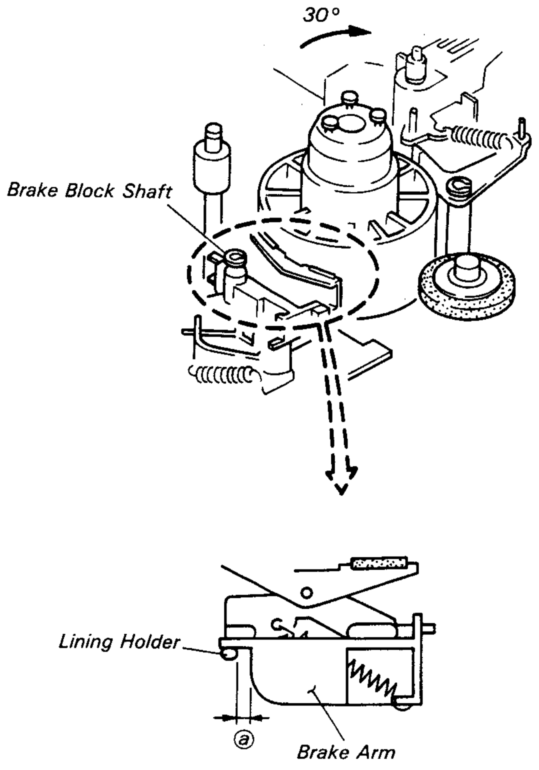
(1) Bend the Brake Block Shaft toward the reel table (or in the opposite direction) by hand.

For Spec. (2)

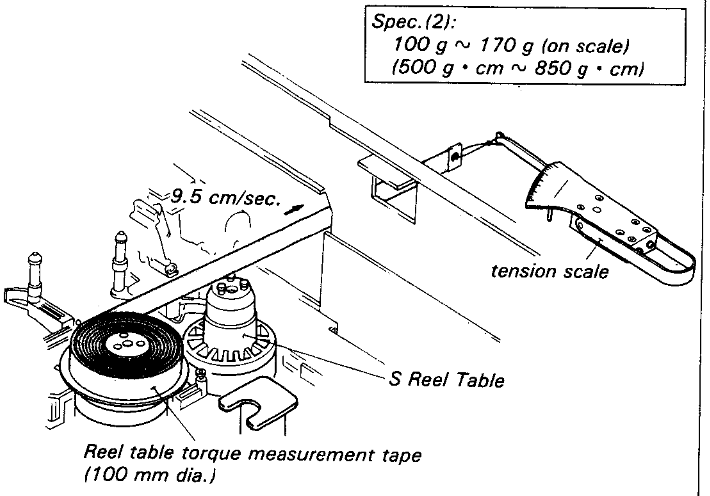
(2) Clean the surface of the reel table with a cloth moistened with cleaning fluid.

(3) If does not meet the specification (2), replace the Lining Holder and check again.

(4) If does not meet the specification in Step (3), replace the reel table and check again.


30°
Brake Block Shaft
Lining Holder
ⓐ
Brake Arm

Spec.(1):
0.6 mm ≦ ⓐ ≦ 1.0 mm



Spec.(2):
100 g ∿ 170 g (on scale)
(500 g • cm ∿ 850 g • cm)

9.5 cm/sec.
tension scale
S Reel Table
Reel table torque measurement tape
(100 mm dia.)

6-1-3. REW Brake Torque Adjustment

Mode: REW mode

Tool: Reel table torque measurement tape (100 mm dia.)
Tension scale (50 g full scale)

Check procedure:

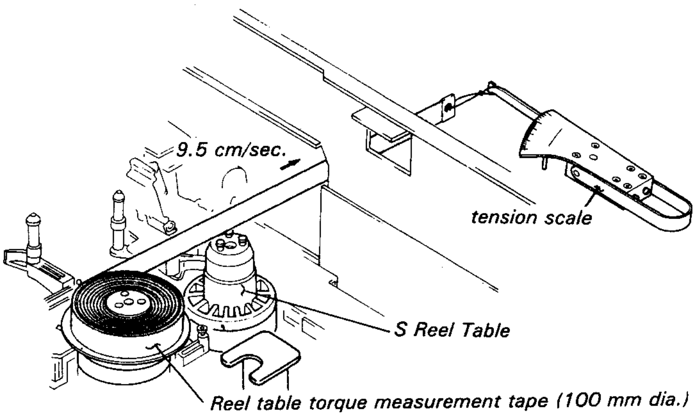
(1) Place the jig tape on the T Reel Table and hook a tension scale to the end of the jig tape.

(2) Put the unit into the REW mode. Pull out the tape at a constant speed of approx. 9.5cm/sec. in the direction of the arrow. Check that the scale reading meets the required specification.

Adjustment procedure:

(1) If does not meet the specification, replace the R Brake Ass'y and check again.

(2) If does not meet the specification in Step (1), replace the Reel Table and check again.


9.5 cm/sec.
tension scale
S Reel Table
Reel table torque measurement tape (100 mm dia.)

Spec.:
18 g ~ 36 g (on scale)
(90 g • cm ~ 180 g • cm)

6-2. F FWD / REW TORQUE ADJUSTMENT

. It is required that the Section 5-7-2, T Idler Solenoid Position Adjustment and Section 5-7-3, S Idler Solenoid Position Adjustment are correct before initiating this adjustment.

Mode: F FWD and REW modes

Tool: Reel table torque measurement tape
(100 mm dia.)
Tension scale (500 g full scale)

Check procedure:

F FWD Torque

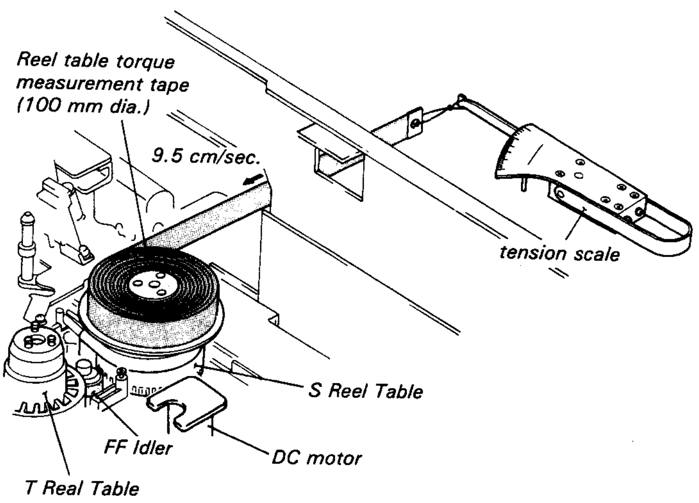
(1) Place the jig tape on the T Reel Table and hook a tension scale to the end of the tape. Pull out the tape.

(2) Put the unit into the F FWD mode. Let the tape be pulled at a constant speed of approx. 9.5cm/sec. Check that the scale reading meets the required specification.

REW Torque

(3) Install the jig tape on the S Reel Table and hook a tension scale to the end of the tape. Pull out the tape.

(4) Put the unit into the REW mode. Let the tape be pulled at the constant speed of approx. 9.5cm/sec. Check that the scale reading meets the required specification.



Spec.:
The Tension scale reading of FF Torque and RWD Torque is more than 300 g · (more than 1500 g · cm)

Adjustment procedure:

Both F FWD Torque and REW Torque are adjusted by the following adjustment procedures.

(1) Clean the surface of the Reel Table, FF idler and belt with a cloth moistened with cleaning fluid. Check the torque again.

(2) If Step (1) does not meet the specification, put the unit into F FWD or REW mode without a cassette tape. Check that the dc voltage at the terminals of the dc motor is 10.5 ± 1.5V. If the dc voltage is out of specification, check that the circuit operation of the SY Board operates correctly.

(3) If does not meet the specification in Steps (1) and (2), replace the Reel Table, FF idler and belt.

6-3. FWD TORQUE ADJUSTMENT

Tool: Special shorting clip
(Refer to the figure.)

Mode: 1/2 FWD SEARCH mode

Check procedure:

(1) Insert a KCS-20 cassette tape wound to the tape end portion.

(2) Put the unit into the FWD SEARCH X 5 mode.

(3) Short between TP3 on the SY-106A Board and GND with a shorting clip.

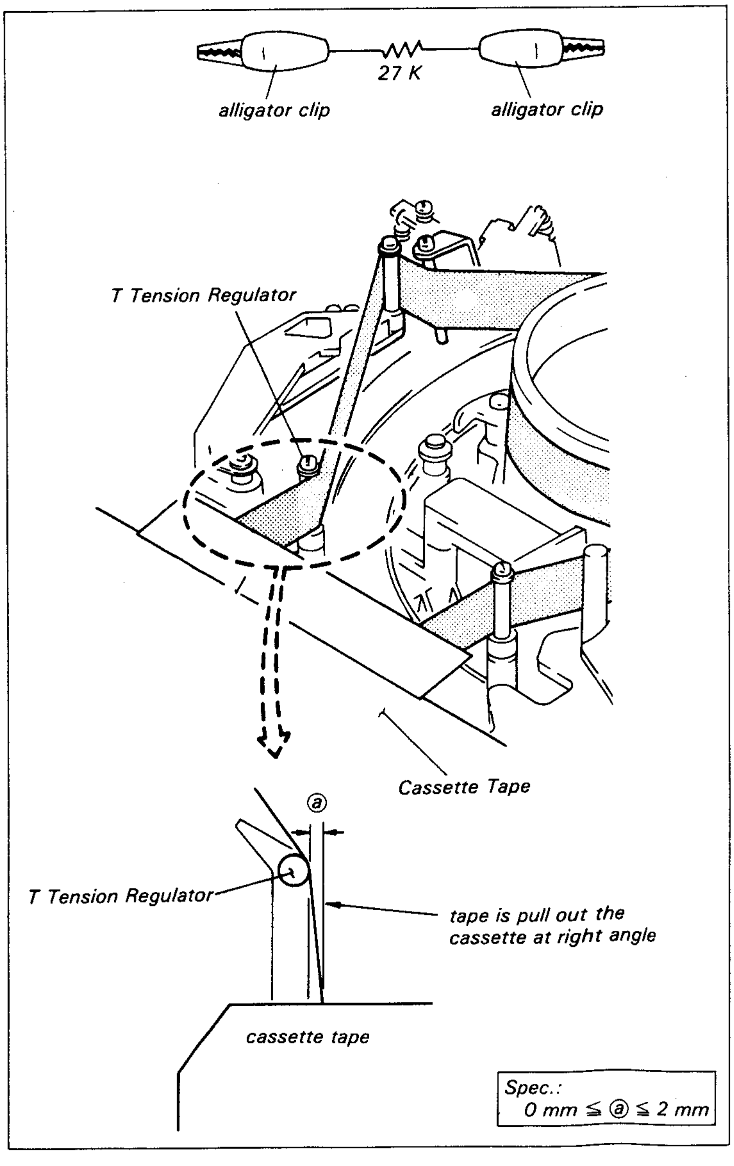
(4) Short between TP11 on the SV-93E Board and GND with a shorting clip.

(5) Short between pin 5 of IC 20 on the SV-93E Board and GND with the special shorting clip. (The unit is put into the FWD SEARCH mode.

(6) Check that the relationship between the T Tension Regulator Arm and cassette tape meets the required specification.

Adjustment procedure:

(1) Adjust RV3 on the SY-106A Board until it meets the required specification in the FWD mode.


27 K
alligator clip
alligator clip
T Tension Regulator
Cassette Tape
ⓐ
T Tension Regulator
tape is pull out the cassette at right angle
cassette tape

Spec.:
0 mm ≦ ⓐ ≦ 2 mm

6-4. REV TORQUE ADJUSTMENT

Tool: Spcial shorting clip
(Refer to Section 6-3.)

Mode: 1/2 REV SEARCH mode

Check procedure:

(1) Insert a KCA-60 cassette tape wound to the tape beginning portion.

(2) Put the unit into the FWD SEARCH X 5 mode.

(3) Short between TP3 on the SY-106A Board and GND with a shorting clip.

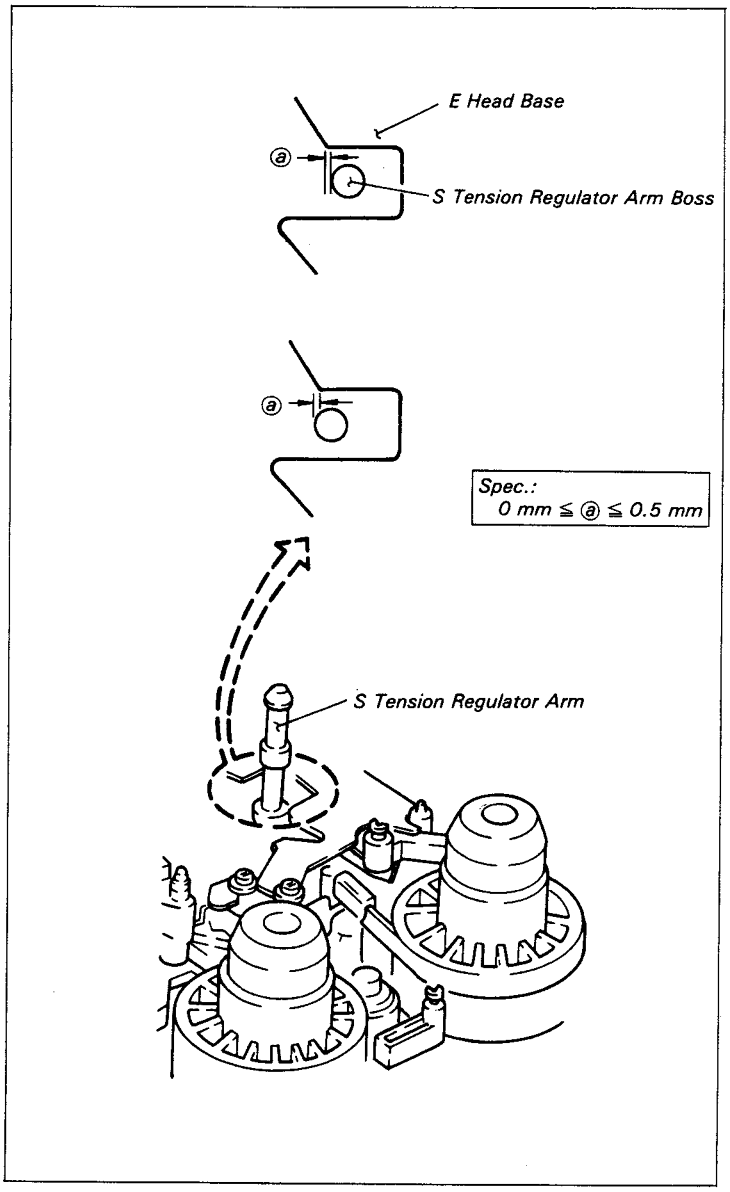
(4) Short between TP11 on the SV-93E Board and GND with a shorting clip.

(5) Short between pin 5 of IC 20 on the SV-93E Board and GND with the special shorting clip. (The unit is put into the FWD SEARCH mode.

(6) Check that the relationship between the S Tension Regulator Boss and the bracket of the Erase Head Base meets the required specification.

Adjustment procedure:

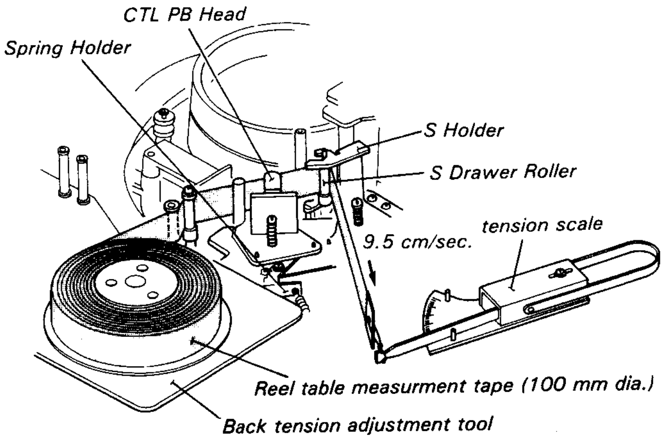
(1) Adjust RV2 on the SY-106A Board until it meets the required specification.



Spec.:
0 mm ≦ ⓐ ≦ 0.5 mm

6-5. F FWD BACK TENSION ADJUSTMENT

- It is required that the Section 5-6-3, S Tension Regulator Operating Position Adjustment is correct before initiating this adjustment.
- It is required that the Section 6-6, FWD Back Tension Adjustment is performed after this adjustment.



Spec.:
40 g ~ 47 g (on scale)

Tool: Back tension adjustment jig
Reel table torque measurement tape (100 mm dia.)
Tension scale (50 g full scale)

Preparation:

(1) Turn the power ON and put the unit into the FR-STOP mode. (When the power is ON, the S Drawer Arm moves and the unit automatically enters the FR-STOP mode.)
(2) Turn the Pulley of Gear Box Block by hand in the direction of the Threading Ring until the S Drawer Roller is in front of the CTL PB Head.
(3) Place the Back Tension Adjustment Jig.
(4) Place the jig tape on the S Reel Table and pull out the tape as shown in the figure. Check that the tape does not curl at the flange of the S Drawer Roller.
(5) Turn the Pulley in the opposite direction in Step (2) until the S Drawer Roller is engaged with the S Holder.
(6) Hook a tension scale to the end of the tape.

Check procedure:

(1) Press the F FWD button and put the unit into the F FWD mode.
(2) Pull out a tape at a constant speed of approx. 9.5cm/sec. in the direction of the arrow. Check that the scale reading meets the required specification.

Adjustment procedure:

(1) Move the position of the Spring Holder with a flatblade screwdrivers (3mm dia.) to meet the required specification.
(2) After the adjustment, perform the check procedures again.
(3) Perform the Section 6-6, FWD Back Tension Adjustment.

6-6. FWD BACK TENSION ADJUSTMENT

. It is required that the Section 5-6-3, S Tension Regulator Operating Position Adjustment and the Section 6-5, F FWD Back Tension Adjustment are correct before initiating this adjustment.

Tool: Back tension adjustment jig
Reel table torque measurement tape
(100 mm dia.)
Tension scale (100 g full scale)

Preparation:

(1) Push the Skew Lock Arm in the direction of the arrow.

(2) Turn the power ON and put the unit into the FR-STOP mode. (When the power is ON, the S Drawer Roller moves and the unit automatically enters the FR-STOP mode.)

(3) Turn the pulley of Gear Box Block by hand in the direction of the Threading Ring until the S Drawer Roller is in front of the CTL PB Head.

(4) Place the Back Tension Adjustment Jig.

(5) Place the jig tape on the S Reel Table and pull out the tape as shown in the figure. Check that the tape does not curl at the flange of the S Drawer Roller.

(6) Turn the Pulley of the Gear Box in opposite direction in Step (3) until the S Drawer Roller is engaged with the S Holder.

(7) Hook a tension scale to the end of tape.

Check procedure:

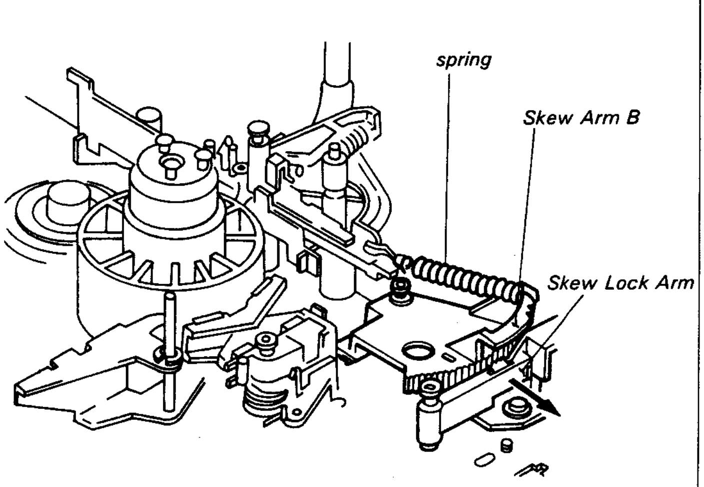
(1) Press the PLAY button and put the unit into the PLAY mode.

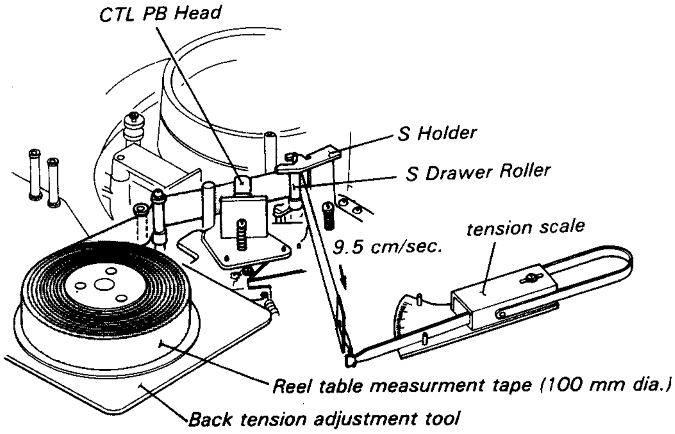
(2) Pull out the tape at a constant speed of approx. 9.5cm/sec. in the direction of the arrow. Check that the scale reading meets the required specification.

Adjustment procedure:

(1) Adjust the position of the proper spring hook of the Skew Arm B to meet the required specification.

(2) After adjustment, perform the check procedures again.




CTL PB Head
S Holder
S Drawer Roller
tension scale
9.5 cm/sec.
Reel table measurment tape (100 mm dia.)
Back tension adjustment tool

Spec.:
70 g ∿ 75 g (on scale)

SECTION 7
TAPE RUN ALIGNMENT

7-1. F FWD/REW MODES TAPE PATH ADJUSTMENT

Mode: F FWD and REW modes

Check procedure:

(1) Inserat a KCA-60 cassette tape which has advanced about half way through (about 30 minutes). Put the unit into the REW mode.

(2) Check that the tape tension is equal around the T Drawer Arm. (Spec.1)

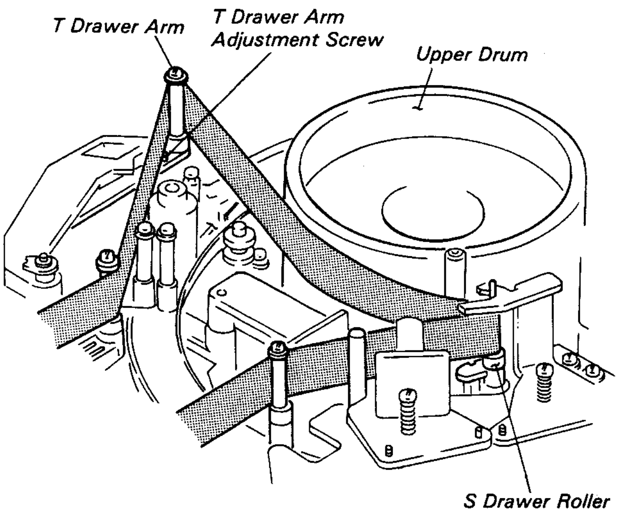
(3) Check that the tape runs without any curling at the upper or lower flange of the S Drawer Roller in the REW mode. (Spec. 2)

(4) Put the unit into the STOP mode, and then into the REW mode. Check that the tape runs without any curling at the S Drawer Roller at the moment just after entering the REW mode. (Spec. 3)

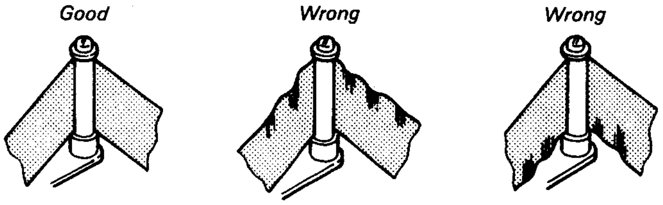
(5) Put the unit into the F FWD mode. Check that the tape runs without any curling at the S Drawer Roller and T Drawer Arm at the moment of just after entering the F FWD mode. (Spec. 4)

Adjustment procedure:

(1) Adjust the slantness of the T Drawer Arm by turning the T Drawer Arm Adjustment Screw.



Spec.(1):



7-2. T CORRECTION GUIDE SLANTNESS ADJUSTMENT

Tool: Dental mirror

Check procedure:

(1) Insert a KCA-60 cassette tape and put the unit into the FR-STOP mode. Just as the Pinch Roller passes in front of the T Correction Guide, quickly turn the power OFF.

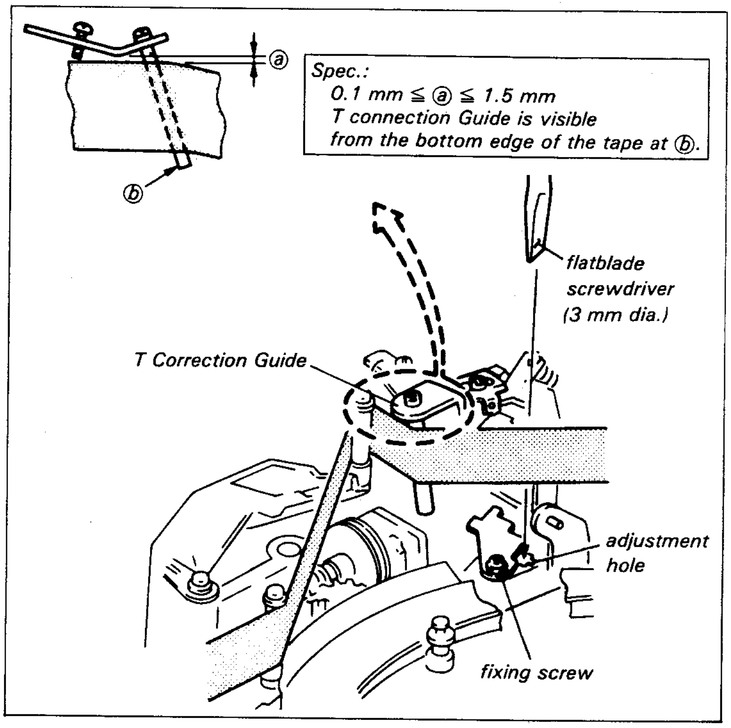
(2) Check that the clearance between the upper bracket of the T Correction Guide and the top edge of the tape meets the required specification.

Adjustment procedure:

(1) Loosen the fixing screw of the T Correction Guide 1/4 to 1/2 turn.

(2) Adjust the position of the T Correction Guide with a flatblade screwdriver (3 mm dia.) to meet the required specification.

(3) After adjustment, perform Section 7-3, PLAY Mode Tape Path Adjustment (1).


ⓐ
ⓑ
Spec.:
0.1 mm ≦ ⓐ ≦ 1.5 mm
T connection Guide is visible
from the bottom edge of the tape at ⓑ.
flatblade
screwdriver
(3 mm dia.)
T Correction Guide
adjustment
hole
fixing screw

7-3. PLAY MODE TAPE PATH ADJUSTMENT (1)

- It is required that Section 7-2, T Correction Guide Slantness Adjustment and Section 7-1, F FWD/REW Modes Tape Path Adjustment are correct before initiating this adjustment.

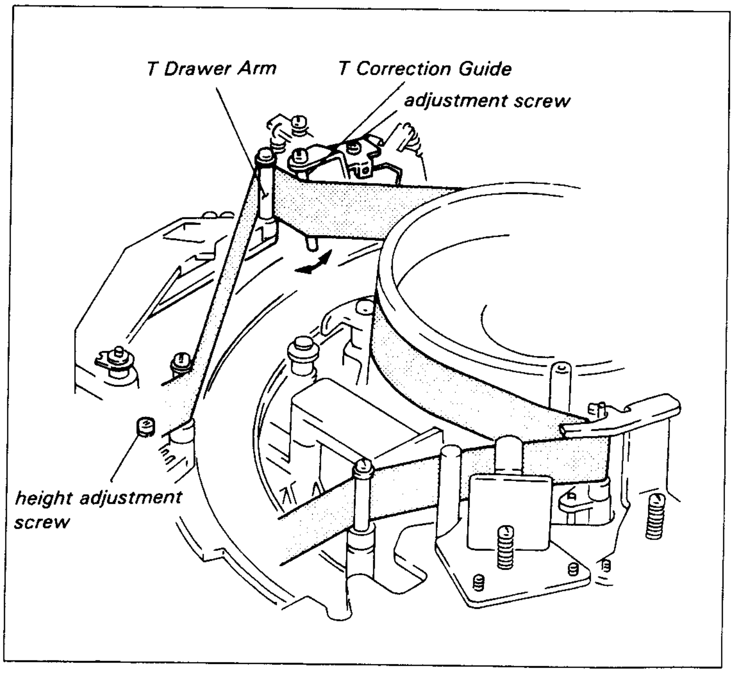
Mode: PLAY mode with a cassette tape

Check procedure:

(1) Insert a KCA-60 cassette tape which has been advanced about half way through (30 minutes). Put the unit into the PLAY mode.

(2) Check that the tape runs without any curling at the upper or lower flange of the T Drawer Guide. (Spec.1)

(3) Check that tape tension is equal at the top and bottom edges of the tape around the T Drawer Guide, and that the tape runs without any curling at the lower flange of the T Drawer Guide. (Spec.2)


T Drawer Arm
T Correction Guide
adjustment screw
height adjustment
screw

Adjustment procedure:

For Spec.1

(1) Adjust the height of the T Drawer Arm by turning the T Drawer Arm Height Adjustment Screw.

For Spec.2

(2) Bend the T Correction Guide in the direction of the arrow. Turn the adjustment screw if necessary to meet the required specification.

7-4. PLAY MODE TAPE PATH ADJUSTMENT (2)

Tool: Dental mirror

Mode: PLAY mode with a cassette tape

Check procedure:

(1) Insert a KCA-60 cassette tape which has been advanced about half way through (30 minutes). Put the unit into the PLAY mode.

(2) At the ※ marks (two positions) in the figure, check that tape tension is equal at the top and bottom edges of the tape. (Spec.1)

(3) Check that the clearance between the lower flange of the Threading Roller and the bottom edge of the tape meets the required specification (2).

Adjustment procedure:

(1) Loosen the fixing screw at the bottom of the Threading Roller.

For Spec.1

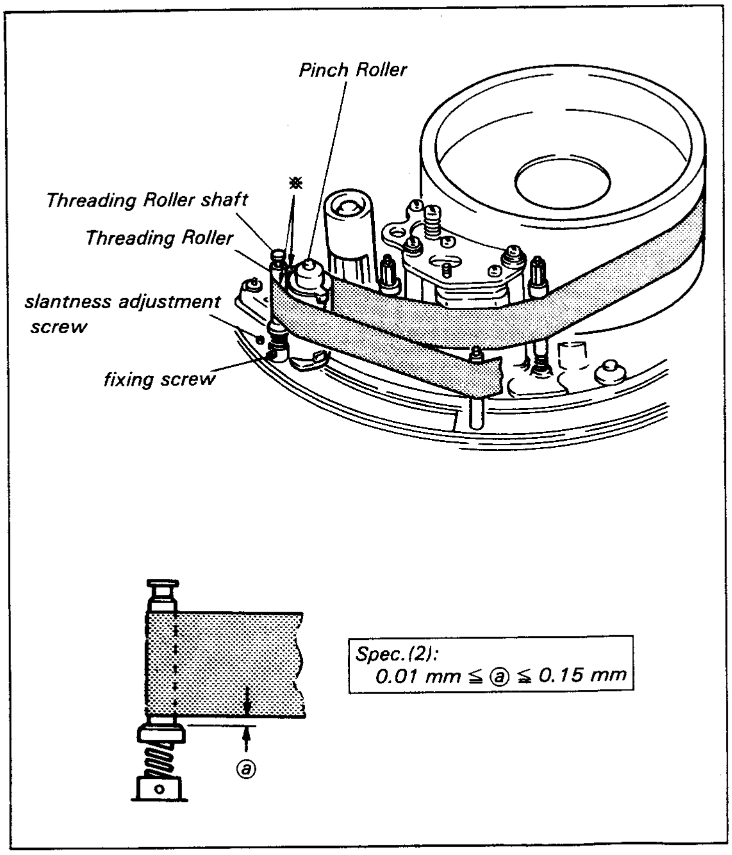
(2) Adjust the slantness of the Threading Roller by turning the slantness adjustment screw.

NOTE:

. After adjustment, perform Section 7-5, REV Mode Tape Path Adjustment and Section 7-6, Tape Path Adjustment Around The Pinch Roller.

For Spec.2

(3) Adjust the height of the Threading Roller by turning the Threading Roller Shaft to meet the required specification.



(4) Check that the slantness and the height meet the required specifications (1) and (2).

(5) After adjustment, tighten the fixing screw of the Threading Roller and perform the check procedure.

7-5. REV MODE TAPE PATH ADJUSTMENT

Check procedure:

(1) Insert a KCA-60 cassette tape which has been advanced about half way through (30 minutes).

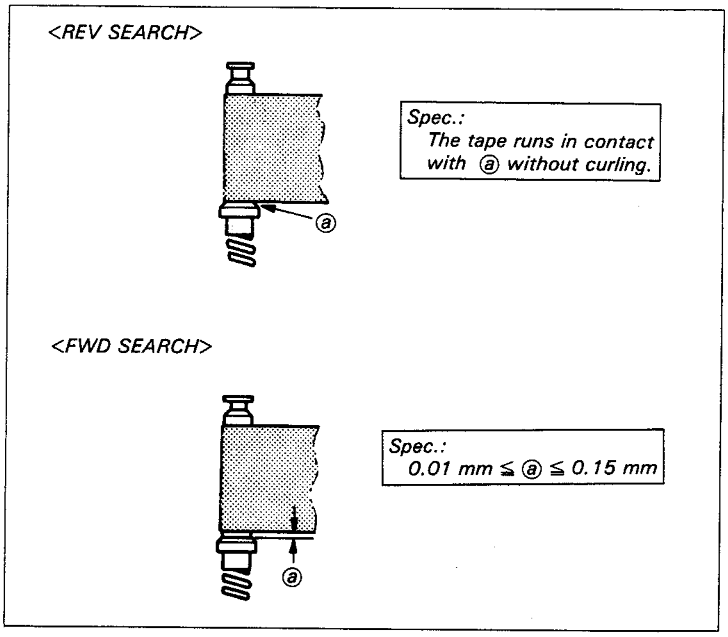
(2) Put the unit into the REV SEARCH mode. Check that the tape runs in contact with the lower flange of the Threading Roller without curling.

(3) Put the unit into the FWD SEARCH mode. Check that the clearance between the lower flange of the Threading Roller and the bottom edge of the tape meets the required specification and the tape does not curl at the lower or upper flange of TG-4.

Adjustment procedure:

(1) Fine adjust the height of the Threading Roller by turning the Threading Roller Shaft.

(2) After adjustment, perform the Section 7-4, PLAY Mode Tape Path Adjustment (2).



<REV SEARCH>

Spec.:
The tape runs in contact with ⓐ without curling.

<FWD SEARCH>

Spec.:
0.01 mm ≦ ⓐ ≦ 0.15 mm

7-6. TAPE PATH ADJUSTMENT AROUND PINCH ROLLER

Check procedure:

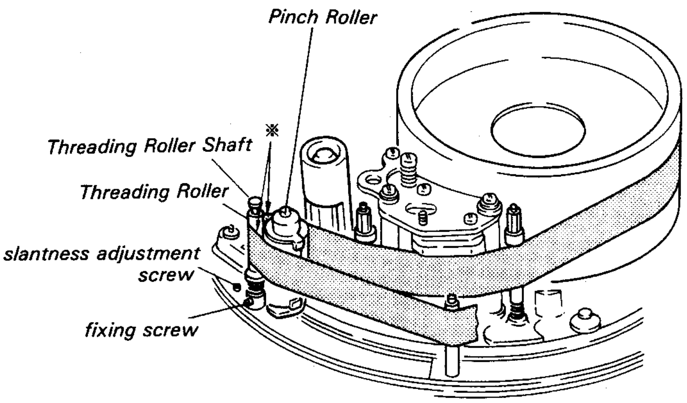
(1) Insert a KCA-60 cassette tape wound to the tape beginning portion.

(2) When put the unit into the PLAY, REV SEARCH, FWD SEARCH modes, check that tape wrinkle does not appear, or disappear within 2 sec.

Adjustment procedure:

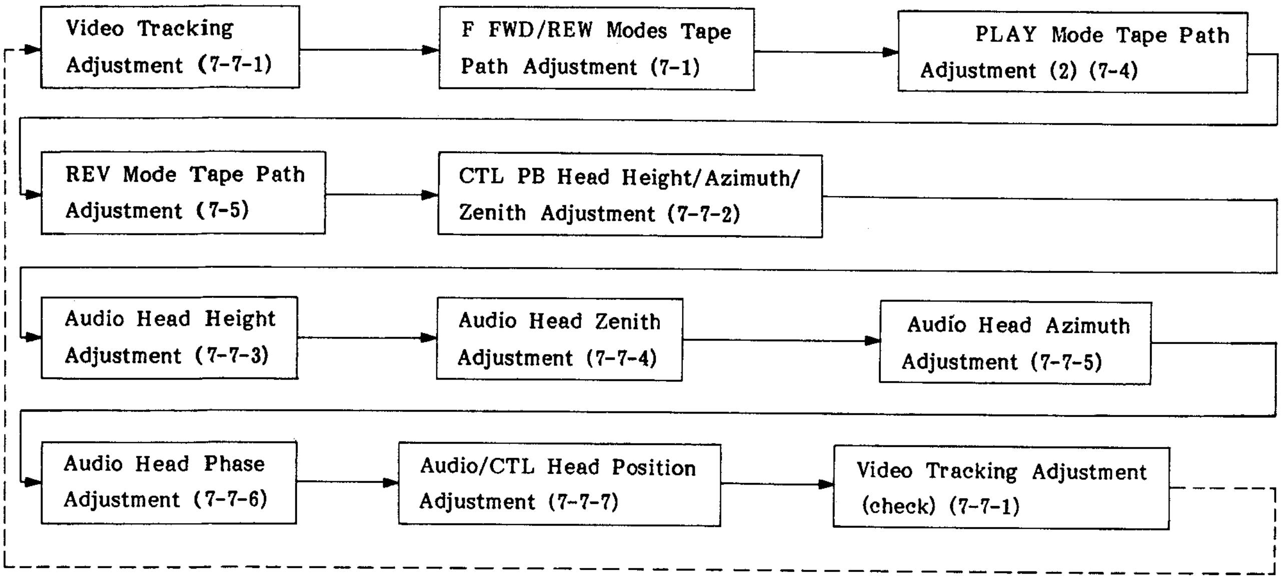
(1) Adjust the slantness and height of the Threading Roller until it meets the required specification.

(2) After adjustment, perform Section 7-4, PLAY Mode Tape Path Adjustment (2), Section 7-5, REV Mode Tape Path Adjustment, and Section 7-7, Tracking Adjustment.


Pinch Roller
※
Threading Roller Shaft
Threading Roller
slantness adjustment screw
fixing screw

7-7. TRACKING ADJUSTMENT

- Perfomrm the Tracking Adjustment is as follw:
  (Numbers in the parenthesis refer to Section Nos.)


Video Tracking Adjustment (7-7-1)
F FWD/REW Modes Tape Path Adjustment (7-1)
PLAY Mode Tape Path Adjustment (2) (7-4)
REV Mode Tape Path Adjustment (7-5)
CTL PB Head Height/Azimuth/ Zenith Adjustment (7-7-2)
Audio Head Height Adjustment (7-7-3)
Audio Head Zenith Adjustment (7-7-4)
Audio Head Azimuth Adjustment (7-7-5)
Audio Head Phase Adjustment (7-7-6)
Audio/CTL Head Position Adjustment (7-7-7)
Video Tracking Adjustment (check) (7-7-1)

7-7-1. Video Tracking Adjustment

Tool: Alignment tape, RR2-1SD PAL
Flatness Plate
Oscilloscope
Dental mirror

Preparation:

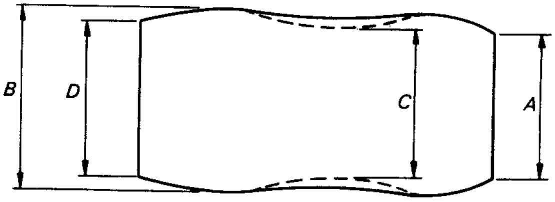
(1) Connect the oscilloscope to TP103 on the VP-26 Board and TP16 on the CO-7A Board.

(2) Playback the color-bar signal portion of the alignment tape.

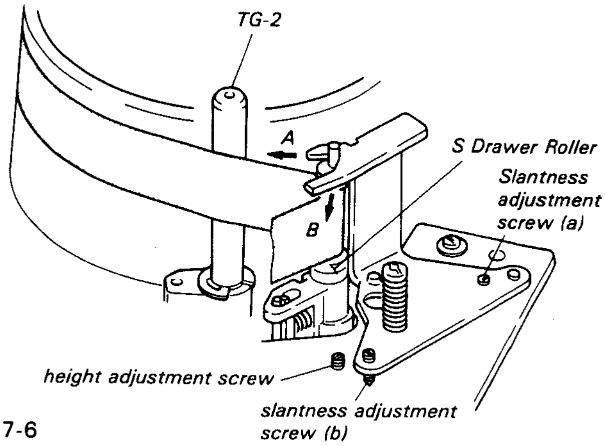
Check procedure:

(1) While turning the TRACKING control knob, check that the RF waveform maintains a flat envelope while the amplitude increases and decreases.

(2) Check that fluctuation and head-to-tape contact of the RF envelope are within the specification at the center detent position of the TRACKING control knob.



Spec.: <head to tape contact>
$\frac{B}{A} \geqq 0.70$ $\frac{C}{A} \geqq 0.70$
<fluctuation>
$\frac{D}{A} \geqq 0.90$


TG-2
A
B
S Drawer Roller
Slantness adjustment screw (a)
height adjustment screw
slantness adjustment screw (b)

Adjustment procedure:

- The S Drawer Roller Block has three adjustment screws. These three adjustment screws function as follows:

(i) Slantness adjustment screw (a)

Turn this screw in the clockwise direction, and the S Drawer Roller slants in the direction of arrow A.

(ii) Slantness adjustment screw (b)

Turn this screw in the counterclockwise direction, and the S Drawer Roller slants in the direction of arrow B. This screw is used for removing tape curl at the upper flange of the S Drawer Roller. However, this screw is used only when the tape curls at the flange of the S Drawer Roller, even though the RF output waveform meets the required specification.

(iii) Height adjustment screw

Turn this screw in the clockwise direction, and the height of the S Drawer Roller lowers.

- When tape guides (TG-3, TG-4) are adjusted, loosen the locking screw about 1 turn and adjust the height by turning the height adjustment nut.
- **When tracking at the entrance side of the drum is not good.**

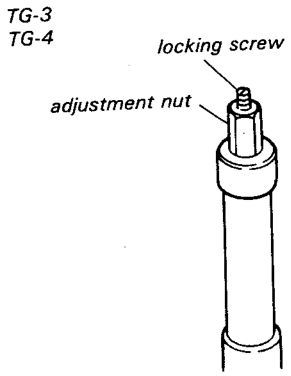
(1) Turn the TRACKING control knob until the RF envelope amplitude is 70 to 80 % of maximum.

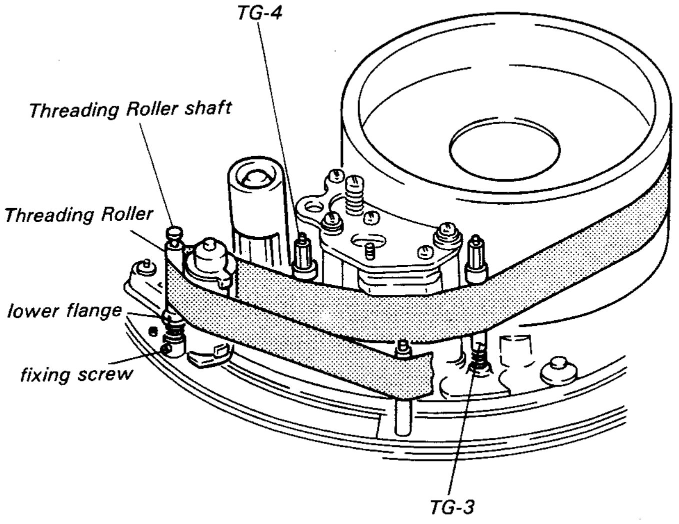
(2) Adjust the height and the slantness of the S Drawer Roller by turning the height adjustment screw and the slantness adjustment screw (a) until the RF envelope of the entrance side is flat.

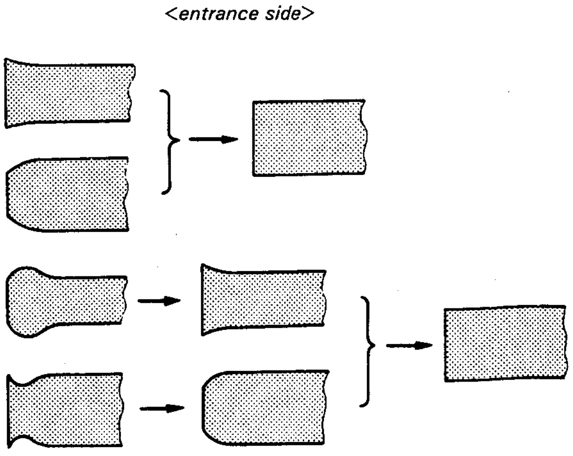
NOTE:

(i) Check the surface of the running tape very carefully around the S Drawer Roller. Check that tape tension is equal at the top and bottom of the tape.

(ii) Check that the tape runs in contact with the upper flange of the S Drawer Roller without any curling.







- **When tracking at the center of the drum is not good.**

  (It is required that the Tracking adjustment at the entrance side of the drum is correct before initiating this adjustment.)

(3) Turn the TRACKING control knob until the RF envelope amplitude is 70 to 80% of maximum.

(4) Adjust the height and the slantness of the S Drawer Roller by turning the height adjustment screw and the slantness adjustment screw (a) until the RF envelope at the center of the drum is flat.

NOTE:

(i) Adjust the slantness adjustment screw (a) in the clockwise direction within a 10 degree angle.

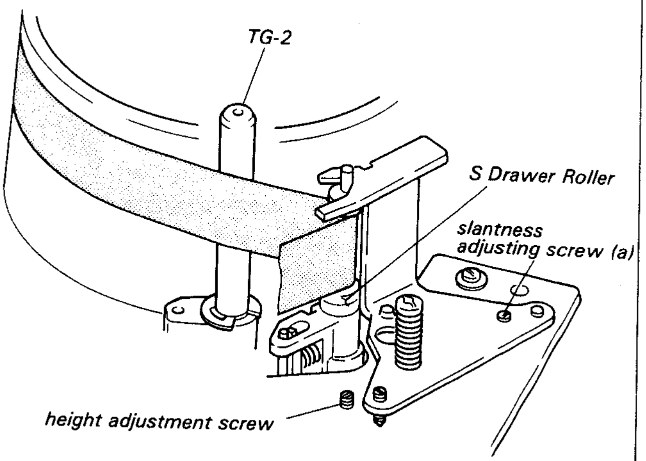
(ii) When the tracking of the center of the drum is adjusted, the FR envelope at the entrance side of the drum should remain flat.

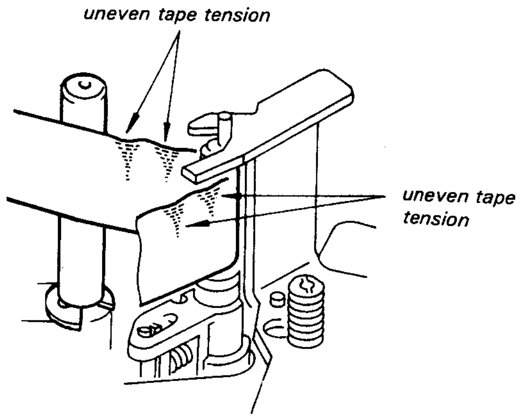
(iii) Check that the tape runs in contact with the upper flange of the S Drawer Roller without any curling.

(5) If the RF envelope is not flat in Step (4), adjust the height of TG-3 and TG-4.

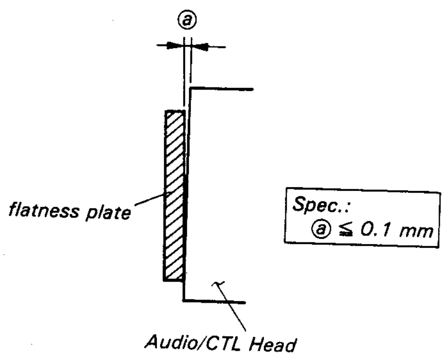
(6) If the RF envelope is not flat in Steps (4) and (5), adjust the zenith of the Audio/CTL Head within the allowable range. Adjust the height of TG-3 and TG-4 again.

(7) Check that the clearance between the bottom edge of the tape and the lower flange of the Threading Roller is 0.01 mm to 0.15 mm. If it is out of the specification, adjust the height of the Threading Roller by turning the the Threading Roller Shaft.


TG-2
S Drawer Roller
slantness adjusting screw (a)
height adjustment screw


uneven tape tension
uneven tape tension

<zenith adjustment for the Audio/CTL Head>


ⓐ
flatness plate
Spec.: ⓐ ≦ 0.1 mm
Audio/CTL Head

- When loosen the fixing screw of the Threading Roller, press the STOP button. When the Threading Roller comes near the Sug-ring Stopper, turn the power OFF. Loosen the fixing screw of the Threading Roller with a L-shaped hexagonal wrench. After adjustment, tighten the fixing screw and check that it meet the required specification.

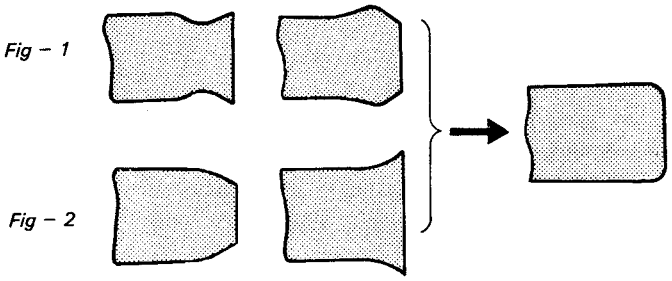
- **When tracking at the exit side of the drum is not good.**

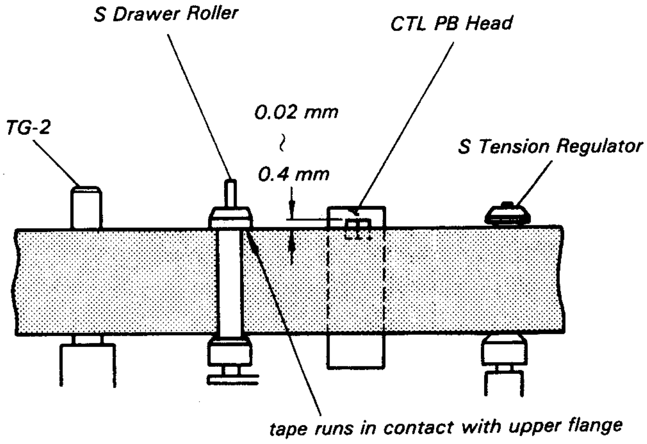
(8) Turn the TRACKING control knob until the RF envelope amplitude is 70 to 80% of maximum.

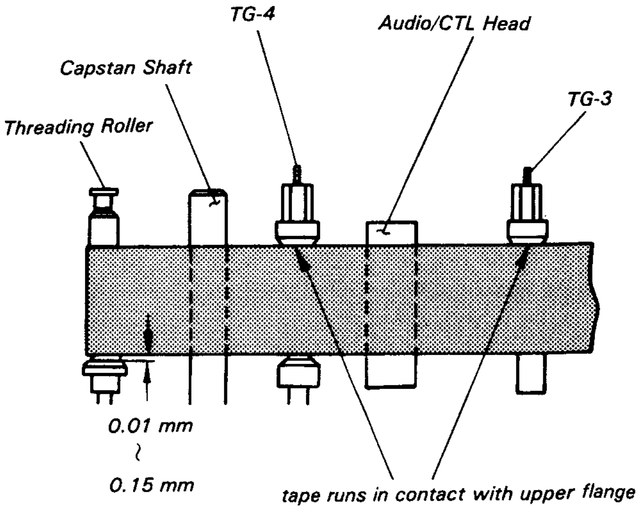
(9) If the RF envelope is not flat as shown in the figure 1, adjust the height of TG-4 until the RF envelope is flat. After this adjustment, adjust the height of TG-3 so that the tape runs in contact with the upper flange. If the RF envelope is not flat as shown in the figure 2, adjust the height of TG-3 and TG-4 until the RF envelope is flat. If it is not, adjust the zenith of the Audio/CTL Head within the allowable range. Adjust the height of TG-3 and TG-4 again.

(10) Check that the clearance between the bottom edge of the tape and the lower flange of the Threading Roller is 0.01 mm to 0.15 mm. If it is out of the specification, adjust the height of the Threading Roller by turning the Threading Roller Shaft.

<entrance side>




S Drawer Roller
CTL PB Head
TG-2
0.02 mm
~
0.4 mm
S Tension Regulator
tape runs in contact with upper flange


TG-4
Audio/CTL Head
Capstan Shaft
TG-3
Threading Roller
0.01 mm
~
0.15 mm
tape runs in contact with upper flange

7-7-2. CTL PB Head Height/Azimuth/Zenith Adjustments

- The CTL PB Head Height, Azimuth, and Zenith Adjustments are closely related. When performing any of these adjustments, always perform the other two adjustments at the same time.

Tool: Flatness plate

Check procedure:

(1) Check that top and bottom clearances between the CTL PB Head and TG-1 meets the required specification. (Spec. 2 : azimuth check)

(2) Check that the clearance between the CTL PB Head and the Flatness Plate meets the required specification, when the flatness plate is placed on the CTL PB Head and TG-1. (Spec. 3 : zenith check)

(3) Insert a cassette tape, and put the unit into the PLAY mode.

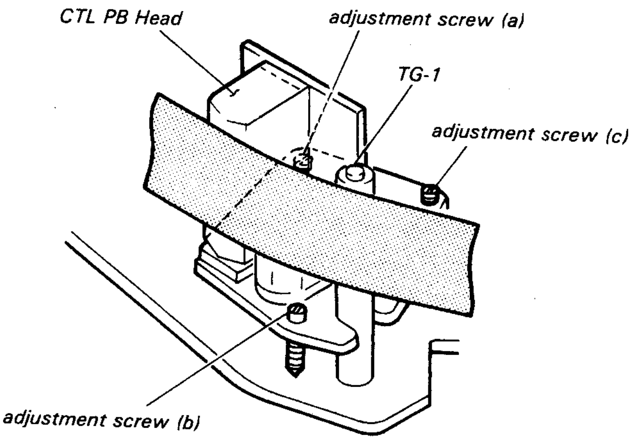
(4) Check that the relationship between the top edge of tape and the CTL PB Head meets the required specification.
(Spec. 1 : height check)

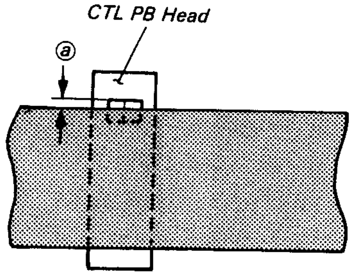
Adjustment procedure:

(1) Adjust adjustment screw (a) to meet the required specification (2).

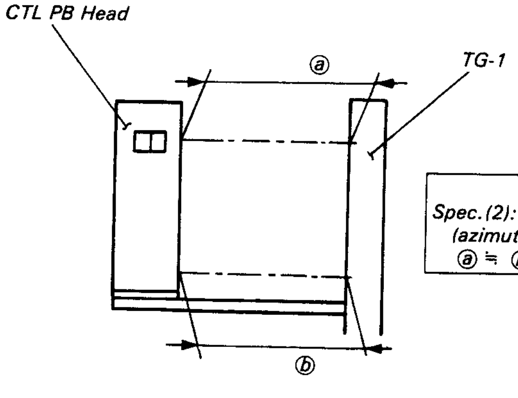
(2) Adjust adjustment screw (b) to meet the required specification (3).

(3) Turn the three adjustment screws an equal amount in the clockwise or counterclockwise direction to meet the required specification (1).

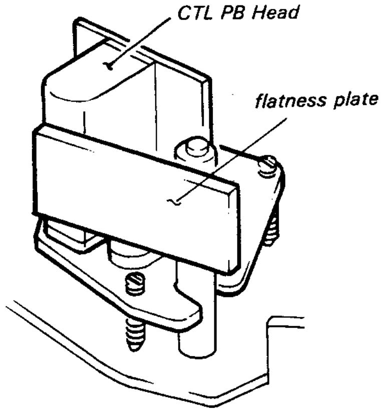


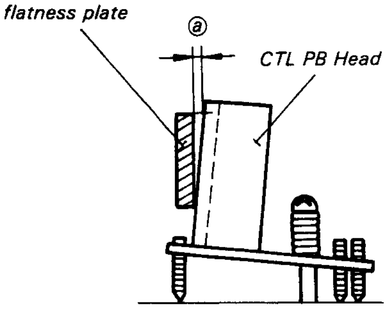


Spec.(1):
(height)
0.02 mm ≦ ⓐ ≦ 0.4 mm

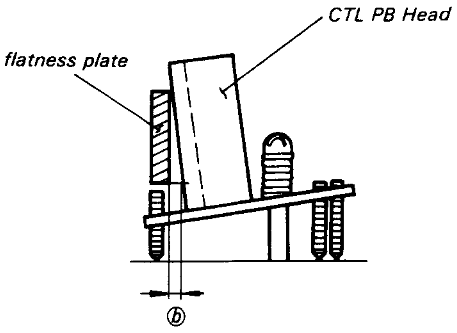


Spec.(2):
(azimuth)
ⓐ ≒ ⓑ


CTL PB Head
flatness plate


flatness plate
ⓐ
CTL PB Head

Spec.(3):
(zenith)
ⓐ ≦ 0.1 mm


CTL PB Head
flatness plate
ⓑ

7-7-3. Audio Head Height Adjustment

Tool: Alignment tape, RR5-1SD PAL
VTVM or oscilloscope

Preparation:

(1) Connect the VTVM or oscilloscope to the AUDIO OUT CH-1 and CH-2 connectors of the connector panel.

(2) Playback the audio 1 kHz signal portion of the alignment tape.

Check procedure:

(1) Check that the CH-1 output level increase is less than 0.5 dB when pressing down at A. If it is out of the specification, perform adjustment procedures (1) and (2).

(2) Check that the CH-2 output level increase is less than 0.5 dB when pushing up at B. If it is out of the specification, perform adjustment procedures (3) and (4).

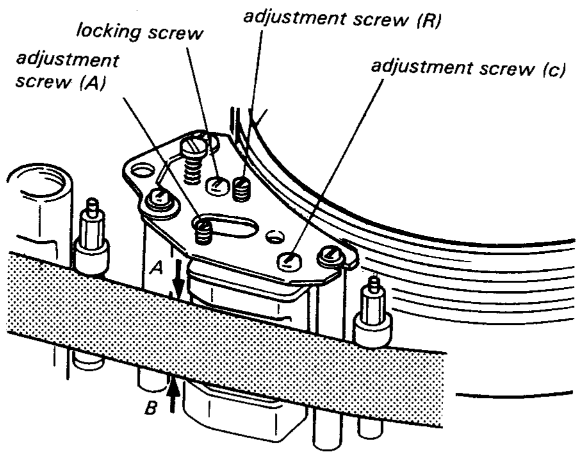
Adjustment procedure:

(1) Loosen the locking screw and turn adjustment screws (R) and (A) an equal amount in the counterclockwise direction. Turn adjustment screw (C) the same amount in the clockwise direction.

(2) Tighten the locking screw and check the height of the Audio Head as described in the check procedure.

(3) Loosen the locking screw and turn adjustment screws (R) and (A) an equal amount in the clockwise direction. Turn the adjustment screw (C) the same amount in the counterclockwise direction.

(4) Tighten the locking screw and check the height of the Audio Head as described in the check procedure.



Spec.:
- *The level increase of the CH-1 is less than 0.5 dB when pressing down at A.*
- *The level increase of the CH-2 is less than 0.5 dB when pushing up at B.*

7-7-4. Audio Head Zenith Adjustment

Tool: Flatness Plate

Check procedure:

(1) When the Flatness Plate is set on the Audio Head and TG-3, check that the clearance between the Audio Head and the Flatness Plate meets the required specification.

Adjustment procedure:

- When the clearance is out of spec. at the top of the Audio Head.

(1) Turn adjustment screw (R) in the counterclockwise direction.

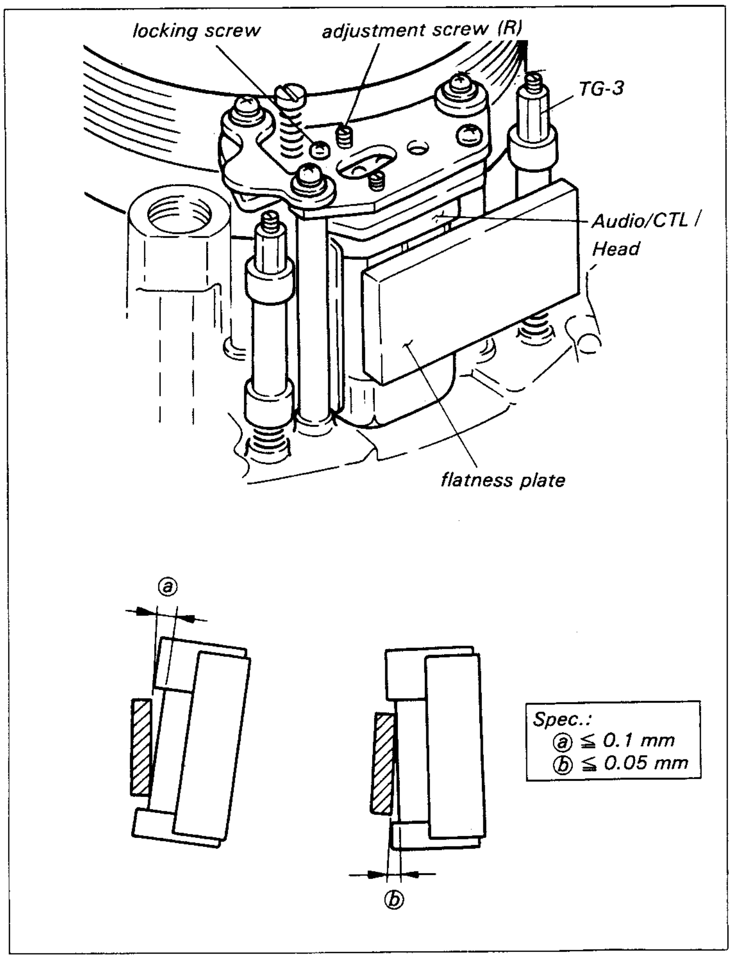
(2) Tighten the locking screw and check the zenith again.

- When the clearance is out of spec. at the bottom of the Audio Head.

(3) Loosen the locking screw 1/4 to 1/2 turn.

(4) Turn adjustment screw (R) in the clockwise direction.

(5) Tighten the locking screw and check the zenith again.



Spec.:
ⓐ ≦ 0.1 mm
ⓑ ≦ 0.05 mm

7-7-5. Audio Head Azimuth Adjustment

Tool: Alignment tape, RR5-1SD PAL
VTVM or oscilloscope

Preparation:

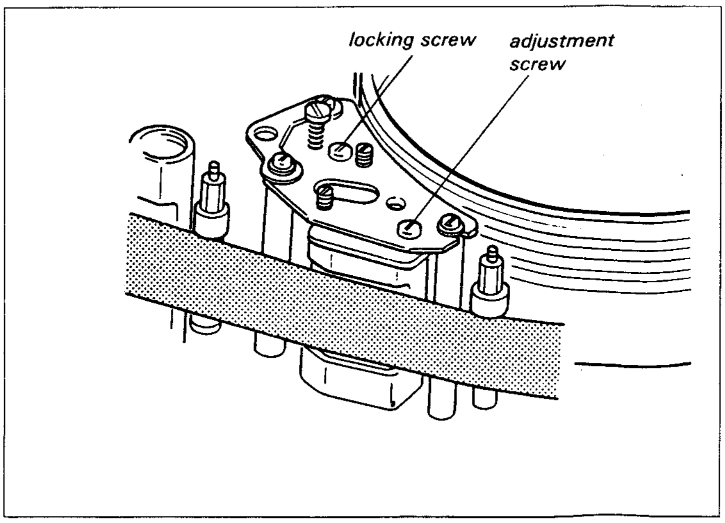
(1) Connect the VTVM or oscilloscope to the AUDIO OUT CH-1 or CH-2 connector of the connector panel.

(2) Playback the audio 10 kHz signal portion of the alignment tape.

Adjustment procedure:

(1) Loosen the locking screw and adjust the audio output level to maximium by turning the adjustment screw.

(2) Tighten the locking screw and performn the check procedure.



7-7-6. Audio Head Phase Adjustment

Tool: Alignment tape, RR5-1SD PAL
Oscilloscope

Preparation:

(1) Connect the horizontal and vertical terminals of the oscilloscope to the AUDIO OUT CH-1 and CH-2 connectors of the connector panel.

(2) Playback the audio 1 kHz signal portion of the alignment tape.

(3) Adjust the scope for a lissajous waveform with horizontal and vertical amplitudes of 6 cm.

Check procedure:

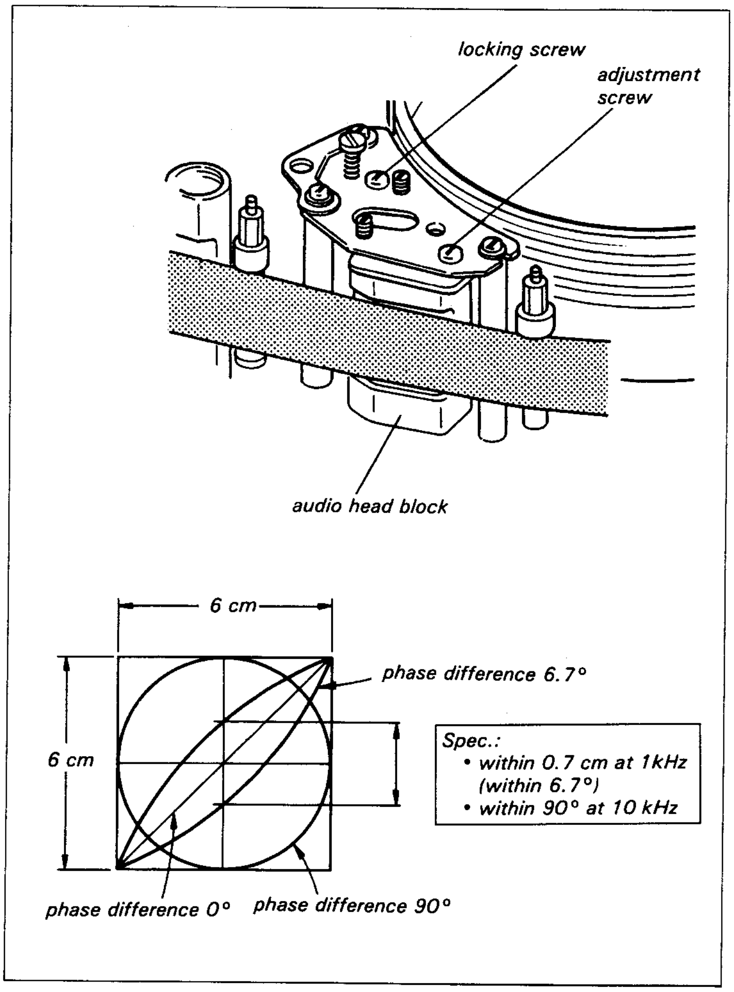
(1) Playback the audio 1 kHz signal portion of the alignment tape, and check that the vertical amplitude at the center in the horizontal direction meets the required specification.

(2) Playback the audio 10 kHz signal portion of the alignment tape, and check that the lissajous waveform meets the required specification.

Adjustment procedure:

(1) Loosen the locking screw 1/4 to 1/2 turn and adjust the phase by turning the adjustment screw.

(2) Tighten the locking screw and check the phase again.


locking screw
adjustment screw
audio head block
6 cm
phase difference 6.7°
6 cm
phase difference 0°
phase difference 90°

Spec.:
- *within 0.7 cm at 1kHz (within 6.7°)*
- *within 90° at 10 kHz*

7-7-7. Audio/CTL Head Position Adjustment

Tool: Alignment tape, RR5-1SD PAL
Oscilloscope

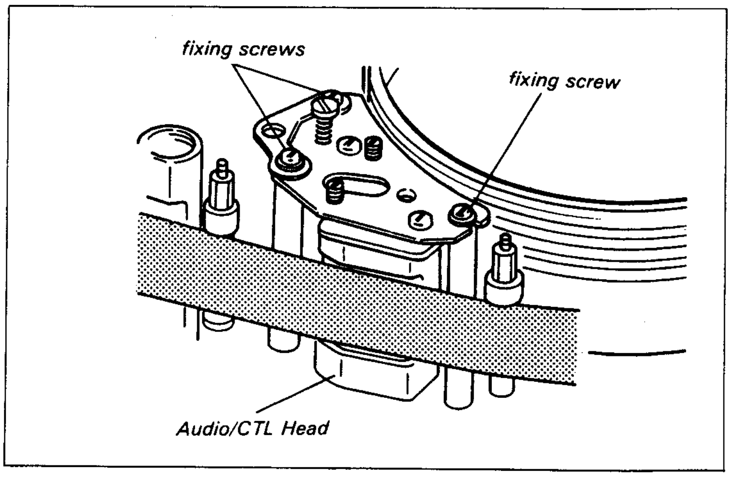
Preparation:

(1) Connect the oscilloscope to TP103 on the VP-26 Board and the EXT.TRIG to TP16 on the CO-7A Board.

(2) Playback the alignment tape.

Check procedure:

(1) While turning the TRACKING control knob, check that the RF envelope has maximum amplitude at the center detent position of the TRACKING control knob.


fixing screws
fixing screw
Audio/CTL Head

Adjustment procedure:

1. (1) Loosen the three fixing screws 1/4 to 1/2 turn.
2. (2) Adjust the position of the Audio/CTL Head with a eccentric screwdriver to meet the required specification.

7-8. VIDEO HEAD DIHEDRAL ADJUSTMENT

Tool: Dihedral adjustment screwdriver
Alignment tape, RR5-1SD PAL
Monitor TV

Check procedure

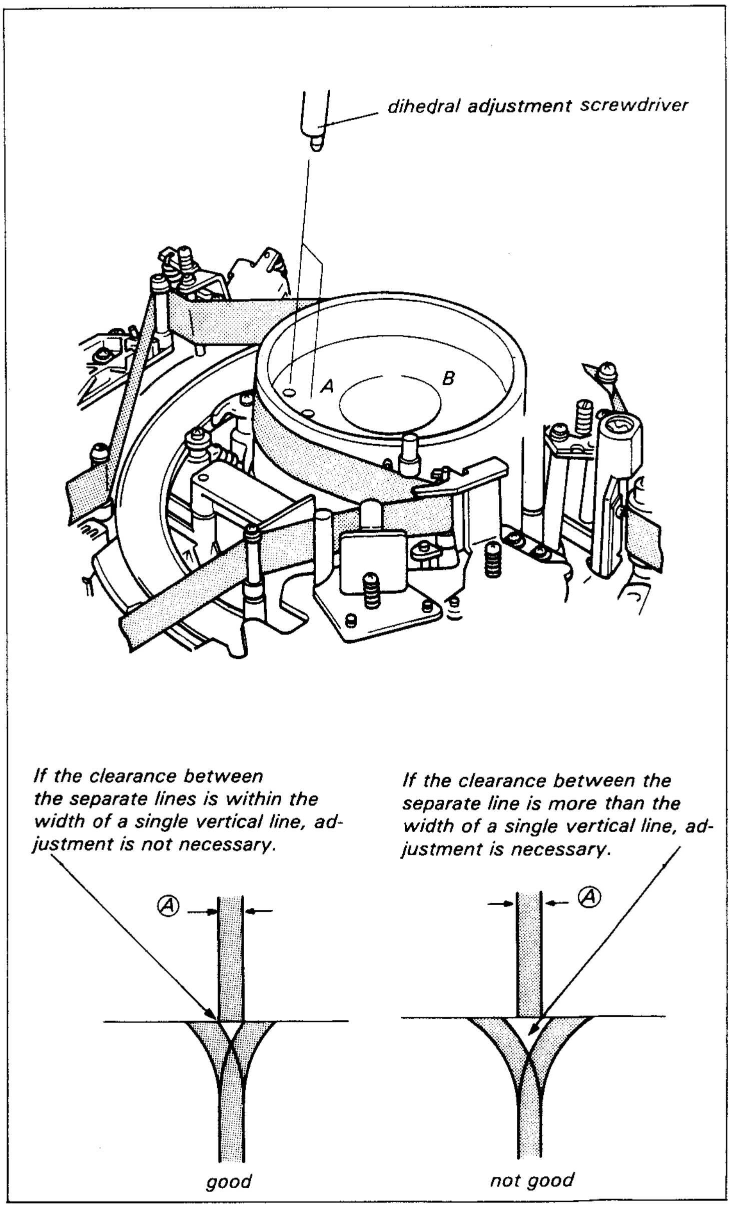
(1) Playback the monoscope signal portion of the alignment tape.

(2) Check the distortion of the monoscope signal under the switching pulse. If the clearance between the separate lines is within the width of a single vertical line, adjustment is not necessary. If the clearance of the separate lines is more than the width of a vertical line, then adjustment is necessary.

Adjustment procedure:

(1) Insert an eccentric screwdriver into the adjustment hole of the white lead and perform the dihedral adjustment.

(2) Play back the monoscope signal portion. If the distortion has become worse, insert an eccentric screwdriver in the other adjustment hole and perform the dihedral adjustment.



If the clearance between the separate lines is within the width of a single vertical line, adjustment is not necessary.

If the clearance between the separate line is more than the width of a single vertical line, adjustment is necessary.

good

not good

SECTION 8
SYSTEM CONTROL ALIGNMENT

[Equipment Required]

- Oscilloscope
- Frequency Counter
- DC Voltmeter
- Alignment Tape: RR5-1SD PAL (Part No.8-960-036-80) −SP tape−

TIME	VIDEO	AUDIO	TIME CODE
5	Color bars	———	———
3	Gated sweep (B/W)	1 kHz, 0 dB	———
3	Gated sweep (color)	10 kHz, −10 dB	———
3	Pulse & bar (MOD 10T and inverted 2T)	1 kHz, −20 dB (NR: OFF) 40 Hz, −20 dB (NR: OFF) 7 kHz, −20 dB (NR: OFF) 10 kHz, −20 dB (NR: OFF) 15 kHz, −20 dB (NR: OFF)	———
3	Monoscope (color)	1 kHz, −20 dB (NR: ON) 15 kHz, −20 dB (NR: ON)	———
3	Pseudo color bars	———	TIME CODE

8-1. TAPE SENSOR BALANCE ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
· Set the cassette tape. · STOP mode	TP2/SY-106A(K-6) 6.0 ± 0.2 V_{dc}	⊘RV1/SY-106A(K-6)

8-2. REEL MOTOR STILL ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
· Connect the AC volt meter to the reel motor terminal (orange) and the chassis of the reel chassis block. · Set to the PLAY-PAUSE mode without the cassette tape.	0.4 ± 0.02 V	⊘RV4/SY-106A(H-6) (Adjust after the reel stops.)

NOTE : Refer to Sec. 6-2 and 6-3 for the adjustment of RV2 and RV3/SY-106A.

SECTION 9

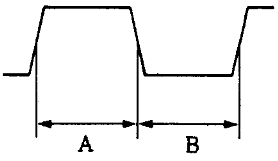
SERVO SYSTEM ALIGNMENT

[Equipment Required]

- Dual Trace Oscilloscope
- Frequency Counter
- Audio Oscillator
- DC Voltmeter
- Blank Tape
- Alignment Tape: RR5-1SD PAL (Part No.8-960-036-80) −SP tape−

TIME	VIDEO	AUDIO	TIME CODE
5	Color bars	———	———
3	Gated sweep (B/W)	1 kHz, 0 dB	———
3	Gated sweep (color)	10 kHz, −10 dB	———
3	Pulse & bar (MOD 10T and inverted 2T)	1 kHz, −20 dB (NR: OFF) 40 Hz, −20 dB (NR: OFF) 7 kHz, −20 dB (NR: OFF) 10 kHz, −20 dB (NR: OFF) 15 kHz, −20 dB (NR: OFF)	———
3	Monoscope (color)	1 kHz, −20 dB (NR: ON) 15 kHz, −20 dB (NR: ON)	———
3	Pseudo color bars	———	TIME CODE

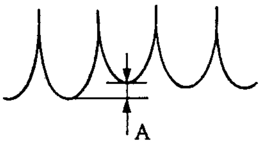
9-1. CAPSTAN FREE SPEED ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
• Play back the color-bar segment of the alignment tape RR5-1SD PAL. • PLAY mode	TP3/SV-93E(G-4)  A+B = 100% B = 50 ± 5% (Take reading at the center of jitter.)	⊘RV100/SV-93E(G-4) TRIG: INT

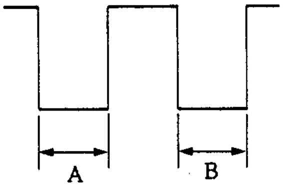
9-2. CAPSTAN 1/30 SPEED ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
• Short between TP3/SY-106A(E-1) and TPE1/SY-106A(H-2) with a shorting clip. • Play back the color-bar segment of the alignment tape RR5-1SD PAL. • SEARCH-PAUSE mode • Short between TP11/SV-93E(B-5) and E1/SV-93E(A-2) with a shorting clip. • Turn the SEARCH dial fully clockwise. • After the adjustment is completed, remove the shorting clips (two points).	TP27/SV-93E(G-4) 60 ± 10 Hz	⊘RV101/SV-93E(H-5) TRIG: INT

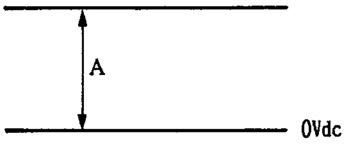
9-3. CAPSTAN STOP SERVO ADJUSTMENT (1)

machine conditions for adjustment	specifications	adjustments
· Play back the color-bar segment of the alignment tape RR5-1SD PAL. · PLAY mode · Short between TP16/SV-93E(H-5) and TP19/SV-93E(H-5) with a shorting clip. · After the adjustment is completed, remove the shorting clip.	TP21/SV-93E(H-6)  $A \leq 0.04\ V_{P-P}$	⊘RV106/SV-93E(I-5) TRIG: EXT TP6/SV-93E(K-2)

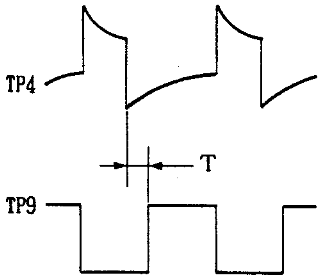
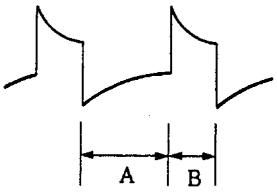
9-4. CAPSTAN STOP SERVO ADJUSUMENT (2)

machine conditions for adjustment	specifications	adjustments
· Play back the color-bar segment of the alignment tape RR5-1SD PAL.	TP25/SV-93E(G-6)  A = B $\left(\frac{B}{A} = 1 \pm 0.1\right)$	⊘RV201/SV-93E(I-5) TRIG: INT

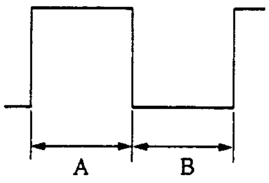
9-5. CAPSTAN STOP SERVO ADJUSTMENT (3)

machine conditions for adjustment	specifications	adjustments
· Play back the color-bar segment of the alignment tape RR5-1SD PAL. · PLAY-PAUSE mode · Short between TP6/SV-93E(J-6) and TP22/SV-93E(H-6) with a shorting clip. · After the adjustment is completed, remove the shorting clip.	TP-26/SV-93E(E-3)  A = 1.0 ± 0.1 V	⊘RV107/SV-93E(H-4) TRIG: INT

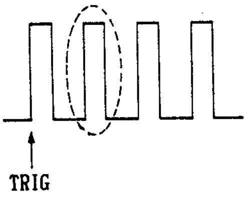
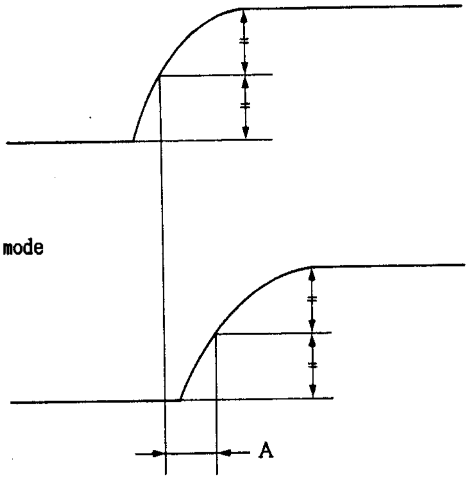
9-6. TRACKING CONTROL MULTI AND CTL POLARITY ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
• Set the TRACKING control to the center position. • Play back the color-bar segment of the alignment tape RR5-1SD PAL. • PLAY mode	TP4/SV-93E(K-4) TP9/SV-93E(K-4) Step 1  T = 0 ± 100 μsec (Take reading at the center of jitter.) Step 2  A > B	⊘RV406/SV-93E(G-6) TRIG: TP9/SV-93E(K-4)

9-7. DRUM FREE SPEED ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
• Play back the color-bar segment of the alignment tape RR5-1SD PAL. • PLAY mode	TP15/SV-93E(E-2)  A + B = 100% A = 50 ± 5%	⊘RV402/SV-93E(N-5) TRIG: INT

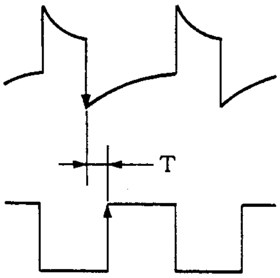
9-8. DRUM AFC LEVEL ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
· Play back the color-bar segment of the alignment tape RR5-1SD PAL. · PLAY and PAUSE modes	TP8/SV-93E(K-2)  NOTE: Magnify the second wave. PLAY mode PAUSE mode  A = 0 ± 0.1 µsec	⊘RV2/SV-93E(F-5) TRIG: INT

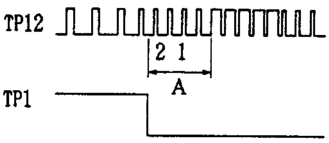
9-9. DRUM AFC TRANSIENT ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
· Play back the color-bar segment of the alignment tape RR5-1SD PAL. · PLAY and PAUSE modes	TP-17/SV-93E(D-2) difference between PLAY mode and PAUSE mode 0 ± 0.1 Vdc ① When PAUSE mode, set the wave of TP17 to the center position of oscilloscope by DC. ② Adjust RV1 so as to set to the same position of PAUSE mode in five seconds when PLAY mode.	⊘RV1/SV-93E(F-2) TRIG: INT

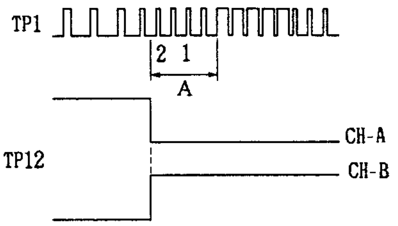
9-10. INSTANT START ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
· Set the TRACKING control to the center position. · Play back the color-bar segment of the alignment tape RR5-1SD PAL. · PLAY-PAUSE mode · Short between TP11/SV-93E(B-5) and E1/SV-93E(A-1) with a shorting clip. · Short between TP3/SY-106A(E-6) and E1/SY-106A(H-6) with a shorting clip. · Release the PAUSE mode. · Adjust RV102 so as to meet the specification. · After the adjustment is completed, remove the shorting clips.	TP4/SV-93E(K-4) TP9/SV-93E(K-4)  T = 0 ± 1 msec (Take reading at the center of jitter.)	⊘RV102/SV-93E(H-3) TRIG: TP9/SV-93E(K-4)

9-11. DRUM LOCK PHASE ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
· SYNC IN connector: color-bar · Play back the color-bar segment of the alignment tape RR5-1SD PAL. · Short between TP10(E-2), TP8(L-6), TP5(M-6) and E3(N-6)/SV-93E with shortig clips. · After the adjustment is completed, remove the shorting clips.	TP12/SV-93E(C-2) TP1/SV-93E(N-4)  A = 2.25 ± 0.2 H Change to the trigger (−) side of oscilloscope, and then confirm to meet the specification.	⊘RV402/SV-93E(N-5) TRIG: TP1/SV-93E(N-4)

9-12. SWITCHING POSITION ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
Step 1. · Short between TP5/SV-93E(M-2), TP8/SV-93E(L-2) and GND with shorting clips. · Play back the color-bar segment of the alignment tape RR5-1SD PAL. · Adjust the TRACKING volume so that the RF output wave can be maximum. Step 2. · Change the trigger of oscilloscope to (+) and (−). · After the adjustment is completed, remove the shorting clips.	TP1/SV-93E(N-4) TP12/SV-93E(C-2)  A = 2.25 ± 0.2 H	CH-A : ⊘RV405/SV-93E(J-2) CH-B : ⊘RV404/SV-93E(M-5) TRIG: TP1/SV-93E(N-4)

SECTION 10

AUDIO SYSTEM ALIGNMENT

[Equipment Required]

- Dual Trace Oscilloscope
- Frequency Counter
- Audio Oscillator
- AC Voltmeter
- Audio Attenuator
- Blank Tape: KCA, KCS and KSP (When adjusting, use KCA and KCS unless otherwise specifically indicated.)
- Alignment Tape: RR5-1SD PAL (Part No.8-960-036-80) –SP tape–

TIME	VIDEO	AUDIO	TIME CODE
5	Color bars	———	———
3	Gated sweep (B/W)	1 kHz, 0 dB	———
3	Gated sweep (color)	10 kHz, −10 dB	———
3	Pulse & bar (MOD 10T and inverted 2T)	1 kHz, −20 dB (NR: OFF) 40 Hz, −20 dB (NR: OFF) 7 kHz, −20 dB (NR: OFF) 10 kHz, −20 dB (NR: OFF) 15 kHz, −20 dB (NR: OFF)	———
3	Monoscope (color)	1 kHz, −20 dB (NR: ON) 15 kHz, −20 dB (NR: ON)	———
3	Pseudo color bars	———	TIME CODE

10-1. ALIGNMENT TAPE PB FREQUENCY RESPONSE ADJUSTMENT

<table>
<tr><th>machine conditions for adjustment</th><th>specifications</th><th>adjustments</th></tr>
<tr>
<td>· Play back the audio frequency response check segment of the alignment tape RR5-1SD PAL.</td>
<td>CH-1 LINE OUT connector (terminated by 600Ω)
CH-2 LINE OUT connector (terminated by 600Ω)
<table>
<tr><th>Frequency</th><th>Level</th></tr>
<tr><td>40 Hz</td><td>0 ±3 dB</td></tr>
<tr><td>1 kHz</td><td>0 dB(REF)</td></tr>
<tr><td>7 kHz</td><td>0 ±0.5 dB</td></tr>
<tr><td>10 kHz</td><td>$0^{+0.4}_{-0.6}$ dB</td></tr>
<tr><td>15 kHz</td><td>$0^{+0.4}_{-1.0}$ dB</td></tr>
</table>
</td>
<td>CH-1:
· 7kHz Level
⊘RV101/AU-82A(J-4)
· 15kHz Level
⊘RV102/AU-82A(J-2)
CH-2:
· 7kHz Level
⊘RV302/AU-82A(H-4)
· 15kHz Level
⊘RV303/AU-82A(H-1)</td>
</tr>
</table>

10-2. ALIGNMENT TAPE PB LEVEL ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
· Play back the audio 1kHz segment of the alignment tape RR5-1SD PAL.	CH-1: TP13/AU-89A(A-1) CH-2: TP113/AU-89A(E-1) −10.0 ± 0.2 dBs	CH-1: ⊘RV103/AU-82A(J-2) CH-2: ⊘RV304/AU-82A(J-1)

10-3. ALIGNMENT TAPE PB LINE OUT LEVEL ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
· Play back the audio 1kHz segment of the alignment tape RR5-1SD PAL.	CH-1 LINE OUT connector (terminated by 600Ω) CH-2 LINE OUT connector (terminated by 600Ω) 4.0 ± 0.3 dBm	CH-1: ⊘RV11/AU-89A(A-1) CH-2: ⊘RV111/AU-89A(B-1)

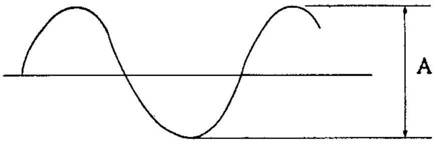
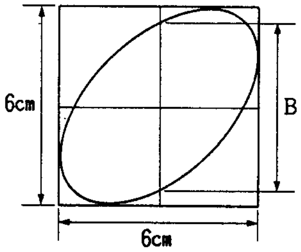
10-4. PB DOLBY DC BALANCE ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
· FR-STOP mode	CH-1: TP314/AU-89A(M-1) TP315/AU-89A(N-1) CH-2: TP316/AU-89A(M-1) TP317/AU-89A(M-1) DC voltage difference = 0 ± 0.1 Vdc	⊘RV315/AU-89A(N-1) ⊘RV316/AU-89A(M-1) TRIG: INT

10-5. PB DOLBY DETECT LEVEL ADJUSTMENT

machine conditions for adjustment	Specifications	Adjustments
· FR-STOP mode	TP318/AU-89A(K-1) E211/AU-89A(L-1) DC voltage = 3.5 ± 0.05 Vdc	⊘RV317/AU-89A(K-1)

10-6. PB PILOT TONE PHASE ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
・Play back the frequency response check segment (NR:ON) of the alignment tape RR5-1SD PAL.	TP312/AU-89A(K-1) TP313/AU-89A(L-1)  $A = 0.5^{+0.1}_{-0}$ Vp-p	⊘RV313/AU-89A(K-1) ⊘RV314/AU-89A(M-1)
・Connect CH-1 of oscilloscope to TP-311/AU-89A(L-1), and CH-2 of oscilloscope to TP312/AU-89A(K-1) to be displayed Lissajous' wave. Adjust the X and Y axes' amplitude. ・Connect the oscilloscope to TP311 /AU-89A(L-1) and TP313/AU-89A (L-1), and then perform the same adjustment.	 B = less than 1.5cm	⊘RV312/AU-89A(L-1)

10-7. PB FREQUENCY RESPONSE ADJUSTMENT

<table>
<tr><th>machine conditions for adjustment</th><th>specifications</th><th>adjustments</th></tr>
<tr><td>・Play back the audio 1kHz segment of the alignment tape RR5-1SD PAL, and then read the line out value(A).
・Short between TP212/AU-89A(C-1) and TP501/AU-89A(F-6) with a 10kΩ shorting clip.
・Play back the frequency response check segment (NR:ON) of the alignment tape RR5-1SD PAL.
・After the adjustment is completed, remove the shorting clip.</td><td>CH-1 LINE OUT connector (terminated by 600Ω)
CH-2 LINE OUT connector (terminated by 600Ω)
<table>
<tr><th>Frequency</th><th>Level</th></tr>
<tr><td>1 kHz</td><td>$A-20\pm1.5$ dB</td></tr>
<tr><td>15 kHz</td><td>$A-20^{+2.2}_{-2.8}$ dB</td></tr>
</table></td><td></td></tr>
</table>

SECTION 11

VIDEO SYSTEM ALIGNMENT

The sec 9. SERVO SYSTEM ALIGNMENT should be completed before initiating this Alignment.
[Equipment Required]

- Dual Trace Oscilloscope
- Frequency Counter
- Video Signal Generator
- Video Sweep Generator
- DC Voltmeter
- Vectorscope
- Blank Tape: KCA, KCS and KSP
- Alignment Tape: RR5-1SD PAL (Part No.8-960-036-80) −SP tape−

TIME	VIDEO	AUDIO	TIME CODE
5	Color bars	———	———
3	Gated sweep (B/W)	1 kHz, 0 dB	———
3	Gated sweep (color)	10 kHz, −10 dB	———
3	Pulse & bar (MOD 10T and inverted 2T)	1 kHz, −20 dB (NR: OFF) 40 Hz, −20 dB (NR: OFF) 7 kHz, −20 dB (NR: OFF) 10 kHz, −20 dB (NR: OFF) 15 kHz, −20 dB (NR: OFF)	———
3	Monoscope (color)	1 kHz, −20 dB (NR: ON) 15 kHz, −20 dB (NR: ON)	———
3	Pseudo color bars	———	TIME CODE

- Alignment Tape: RR5-2SB PAL (Part No.8-960-020-62) −conventional tape−

TIME	VIDEO	AUDIO	TIME CODE
5	Color bars	3 kHz, 0 dB	1 kHz
5	R-F sweep	———	———
5	Monoscope	———	———
2.5	Modulated 20T pulse	1 kHz, 0 dB	———
2.5	R-F 8 MHz	10 kHz, −10 dB	———

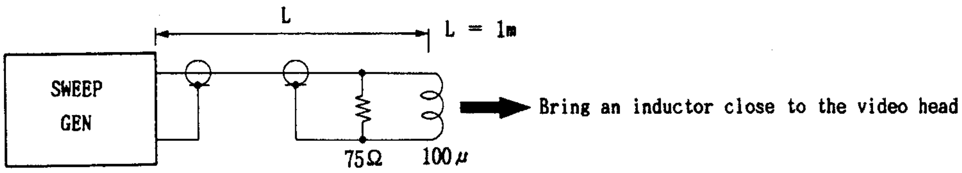
- Alignment Tape: RR5-2SC PAL (Part No.8-960-035-61)

Real Time Counter (min.)	Tape Counter	Video track	Audio track
00 : 00 − 04 : 00	000 − 100	Monoscope	3 kHz, 0 dB
04 : 00 − 09 : 00	100 − 208	Color-bar	———
09 : 00 − 14 : 00	208 − 300	R-F sweep	———
14 : 00 − 16 : 00	300 − 335	Mod. 20T pulse	1 kHz, 0 dB
16 : 00 − 18 : 00	335 − 367	M.S. w/burst	10 kHz, −10 dB
18 : 00 − 20 : 00	367 − 398	Pseudo C.B. for DOC adj.	———

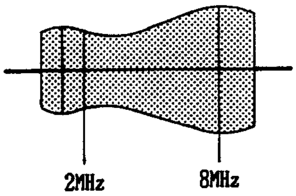
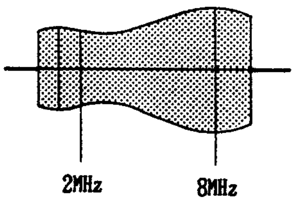
11-1. PB RF ADJUSTMENT

11-1-1. PB Pre-Amplifier Frequency Adjustment

To make this adjustment, stop the rotation of the head drum without cassette tape and to L-couple sweep signal with the video head using an inductor (approx. 100µH).



Sweep signal band width: 1 to 10 MHz

<table>
<tr><th>machine conditions for adjustment</th><th>specifications</th><th>adjustments</th></tr>
<tr><td>Step 1. CH-A frequency adjustment
· POWER ON.
· Couple a sweep signal with the video head (CH-A).
· Adjust coupling so that the amplitude is maximized.
· After the adjustment is completed, remove the shorting clip.</td><td>TP7/RP-35A(B-6)

<table><tr><td>2 MHz</td><td>8 MHz</td></tr><tr><td>100 %</td><td>135±5 %</td></tr></table></td><td>⊘RV4/RP-35A(C-6)
TRIG: TRIG OUT of SWEEP GEN</td></tr>
<tr><td>Step 2. CH-B frequency adjustment
· POWER ON.
· Couple a sweep signal with the video head (CH-B).
· Adjust coupling so that the amplitude is maximized.
· After the adjustment is completed, remove the shorting clip.</td><td>TP10/RP-35A(B-6)

<table><tr><td>2 MHz</td><td>8 MHz</td></tr><tr><td>100 %</td><td>135±5 %</td></tr></table></td><td>⊘RV6/RP-35A(A-6)
TRIG: TRIG OUT of SWEEP GEN</td></tr>
</table>

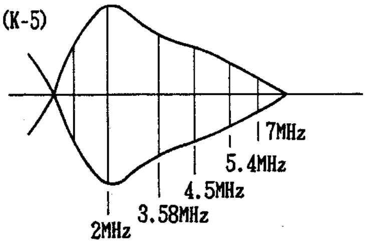
11-1-2. PB RF Frequency Response Adjustment (Middle)

<table>
<tr><th>machine conditions for adjustment</th><th>specifications</th><th>adjustments</th></tr>
<tr><td>

- Short between TP8/SV-93E(L-6) and GND with a shorting clip.
- Play back the RF sweep segment of the alignment tape RR5-2SB PAL.
- Adjust the TRAKING control so that the RF level at TP103/VP-26(K-5) is maximized.
- After the adjustment is completed, remove the shorting clip.

</td><td>

TP103/VP-26(K-5)



<table>
<tr><th>Frequency</th><th>Level</th></tr>
<tr><td>2 MHz</td><td>100%(REF)</td></tr>
<tr><td>3.58 MHz</td><td>102±12%</td></tr>
<tr><td>4.5 MHz</td><td>108±13%</td></tr>
<tr><td>5.4 MHz</td><td>96±15%</td></tr>
<tr><td>7 MHz</td><td>65± 5 %</td></tr>
</table>

Adjust 7MHz level so as to meet the specification. Confirm other frequency so as to meet the specification. When not to meet the specification fine adjust RV40(CH-A) or RV41(CH-B).

</td><td>

CH-A:
⊘RV40/VP-26(K-8)
CH-B:
⊘RV41/VP-26(K-8)

</td></tr>
</table>

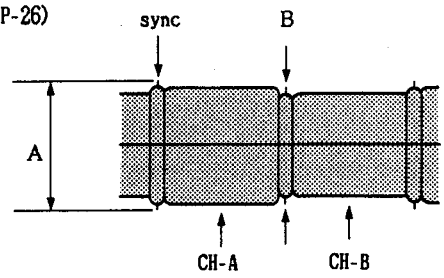
11-1-3. PB Y RF Channel Balance/Level Adjustment

<table>
<tr><th>machine conditions for adjustment</th><th>specifications</th><th>adjustments</th></tr>
<tr><td>

- Play back the color-bar segment of the alignment tape RR5-1SD PAL.
- Adjust the TRACKING control so that the RF level at TP104/VP-26 (H-6) is maximized.

</td><td>

TP104/VP-26(H-6)
(E6/VP-26)



Balance : A = B
Level : A = B = 0.35 ± 0.02 Vp-p

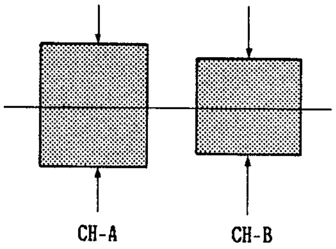
</td><td>

Balance:
⊘RV39/VP-26(K-7)
Level:
⊘RV38/VP-26(K-7)

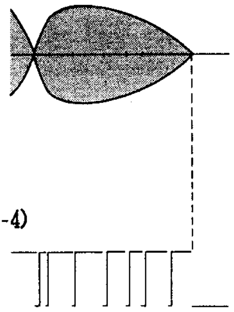
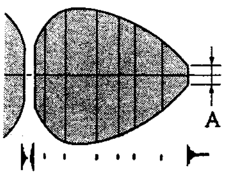
TRIG: TP16/CO-7A(H-6)

</td></tr>
</table>

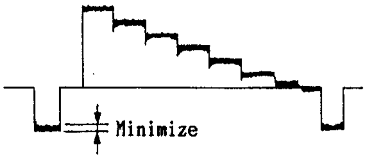
11-1-4. PB Chroma RF Channel Balance/Level Adjustment

machine conditions for adjustment	specifications	adjustments
• Play back the color-bar segment of the alignment tape RR5-1SD PAL. • Adjust the TRACKING control so that the RF level at TP7/CO-7A (H-6) is maximized.	TP7/CO-7A(H-6)  Balance : CH-A Level = CH-B Level Level : 0.2 ± 0.02 Vp-p	Balance: ⊘RV36/VP-26(K-7) Level: ⊘RV37/VP-26(K-5) TRIG: TP16/CO-7A(H-6)

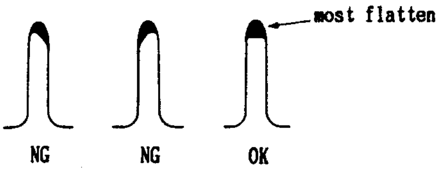
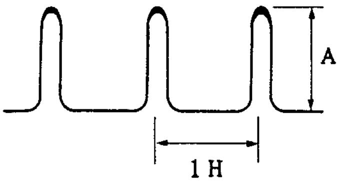
11-2. DROPOUT COMPENSATOR SENSITIVITY ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
• Play back the RF sweep segment of the alignment tape RR5-2SB PAL. • TRACKING volume: FIXED • Short between TP8/SV-93E(L-6) and E3/SV-93E(N-6) with a shorting clip. • After the adjustment is completed, remove the shorting clip.	CH-1: TP104/VP-26(H-6)  CH-2: TP105/VP-26(B-4) oscilloscope: ADD mode  A = 30 ± 4 mVp-p	⊘RV35/VP-26(G-7) TRIG: EXT TP16/CO-7A(H-6)

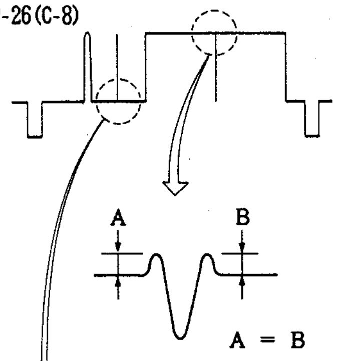
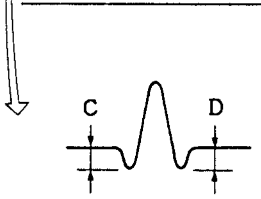
11-3. CARRIER BALANCE ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
・Play back the color-bar segment of the alignment tape RR5-2SC PAL.	TP106/VP-26(C-8) (E7/VP-26) 	⊘RV24/VP-26(H-6) TRIG: TP16/CO-7A(H-6)

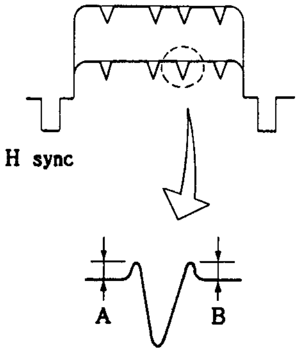
11-4. SP MODE DETECTOR CIRCUIT ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
Step 1. ・Disconnect the shorting socket CP-1/VP-26(F-7). ・Play back the color-bar segment of the alignment tape RR5-2SB PAL.	TP18/VP-26(F-7) 	⊘LV1/VP-26(G-8)
Step 2. ・After the adjustment is completed, connect the shorting socket.	TP18/VP-26(F-7)  A = 2.3 ± 0.1 Vp-p Confirm that SP/HIGH lamp on the front panel is turned ON.	⊘RV106/VP-26(G-8) TRIG: TP9/CO-7A(G-7)

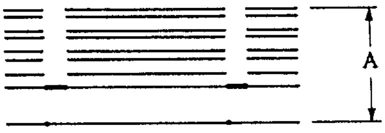
11-5. PB Y PHASE EQUALIZE RRE-ADJUSTMENT (SP and High modes)

machine conditions for adjustment	specifications	adjustments
Step 1. · Turn S1/VP-26(B-2) to ON. · Play back the pulse & bar segment of the alignment tape RR5-1SD PAL.	TP106/VP-26(C-8)  A = B	⊘RV3/VP-26(E-6)
Step 2. · Play back the pulse & bar segment of the alignment tape RR5-2SB PAL. · After this adjustment, turn S1 to OFF.	 C = D	⊘RV2/VP-26(E-6) TRIG: TP9/CO-7A(G-6)

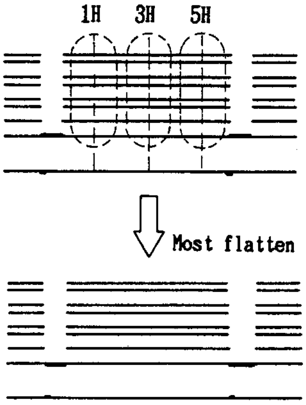
11-6. PB Y PHASE EQUALIZE RRE-ADJUSTMENT (Low mode)

machine conditions for adjustment	specifications	adjustments
· Play back the monoscope segment of the alignment tape RR5-2SC PAL.	TP106/VP-26(C-8)  A = B	⊘RV107/VP-26(E-7) TRIG: TP9/CO-7A(G-6)

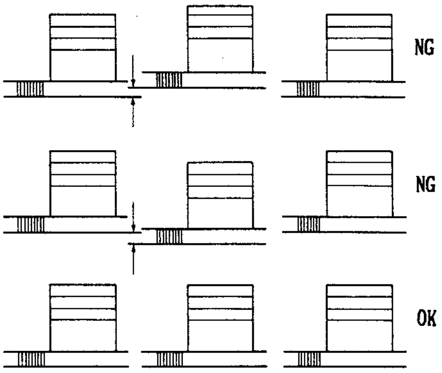
11-7. DUB Y OUTPUT LEVEL ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
· Play back the color-bar segment of the alignment tape RR5-2SC PAL.	TP11/VP-26(H-2)  A = 1.7 ± 0.2 Vp-p	⊘RV4/VP-26(C-9) TRIG: TP16/CO-7A(H-6)

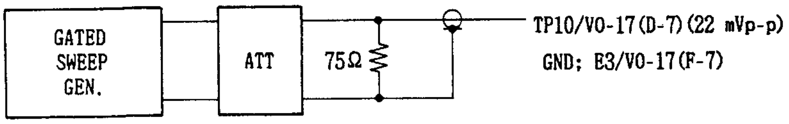
11-8. DROPOUT COMPENSATOR CIRCUIT DC BALANCE ADJUSTMENT

machine conditions for adjustment	specifications	adjustments
· Play back the Pseudo CB for DOC adjustment segment of the alignment tape RR5-1SD PAL.	TP10/VP-26(F-5)  Adjust RV21 and RV105 so that the waveform at 5H portion is flatten.	Level: ⊘RV21/VP-26(C-3) DC Bias: ⊘RV105/VP-26(C-4) TRIG: TP16/CO-7A(H-6)

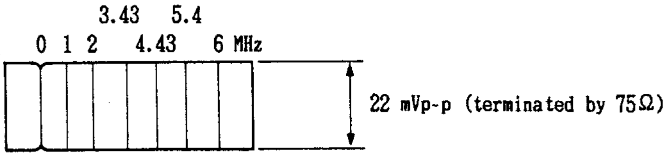
11-9. SP/CONVENTIONAL EDITING POINT DC ADJUSTMENT

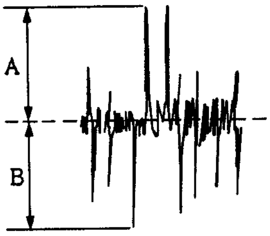
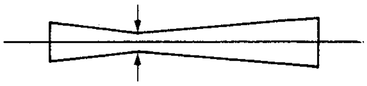
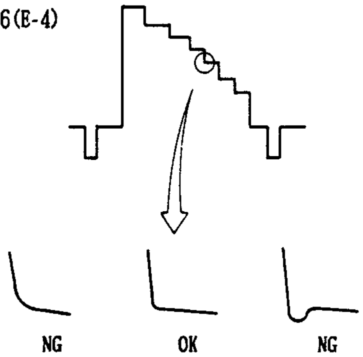
machine conditions for adjustment	specifications	adjustments
	TP106/VP-26(C-8)	●RV6/VP-26(D-7)
• Insert the KSP-60 tape.		
• Produce the SP/Conventional editing tape as following procedure and play back it. ① REC mode ② PAUSE mode ③ Short between TP17/VO-17(G-5) and E7/VO-17(G-5) with a shorting clip. ④ PAUSE mode: OFF ⑤ Remove the shorting clip. ⑥ Repeat the steps ① to ⑤ 10 to 20 times.	Adjust RV6/VP-26(D-7) so that no dc change appears at the editing points.	
• Play back the SP/Conventional editing tape produced by VO-9600P.		TRIG: TP16/CO-7A(H-6)

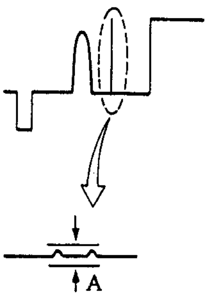
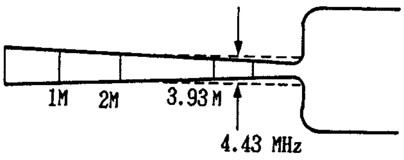
11-10. Y NOISE CANCELLER ADJUSTMENT

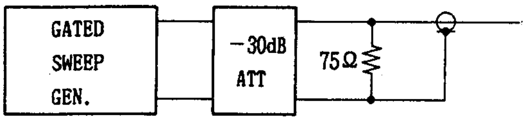

GATED SWEEP GEN.
ATT
75Ω
TP10/VO-17(D-7)(22 mVp-p)
GND; E3/VO-17(F-7)

SWEEP SIGNAL LEVEL at TP10


3.43
5.4
0
1
2
4.43
6 MHz
22 mVp-p (terminated by 75Ω)

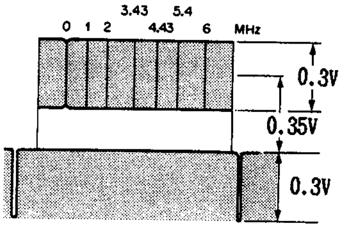
machine conditions for adjustment	specifications	adjustments
Step 1. • Play back the color-bar segment of the alignment tape RR5-1SD PAL.	TP109/VP-26(E-4)  A = B = 100 mV	⊘RV22/VP-26(J-5)
Step 2. • POWER SW: OFF • Desolder SL1/VP-26(C-5) on the soldering side. • Connect the sweep signal as shown in above. • Turn ON the POWER SW. • Fully turn RV22/VP-26(E-5) in the clockwise direction.	TP8/VP-26(B-2)  Minimize the amplitude of the cross point (at 2MHz).	⊘RV23/VP-26(C-4)
Step 3. • Solder SL1/VP-26(C-5). • Play back the color-bar sagment of the alignment tape RR5-1SD PAL.	TP109/VP-26(E-4) 	⊘RV23/VP-26(C-4)

Step 4. ・Play back the pulse & bar segment of the alignment tape RR5-1SD PAL.	TP111/VP-26(G-4)  Minimize the A level.	⊘RV108/VP-26(H-4)
Step 5. ・POWER SW: OFF ・Desolder SL1/VP-26(C-5) ・Connect the gated sweep signal as shown in below. ・Turn ON the POWER SW. ・EE mode ・After this adjustment is completed, solder SL1/VP-26(C-5)	TP4/VP-26(G-2)  1M 2M 3.93M 4.43 MHz Minimize the amplitude of the cross point (at around 4MHz).	⊘RV109/VP-26(G-4)

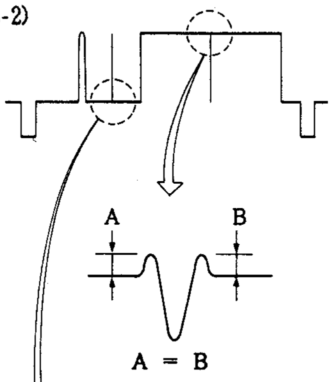
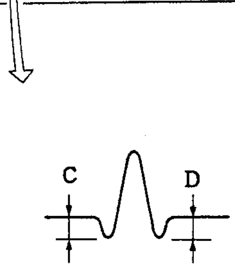

GATED
SWEEP
GEN.
−30dB
ATT
75Ω

TP10/VP-26(D-7)
GND; E3/VP-26(F-7)
(−36dB: when the signal is connected to TP10.)

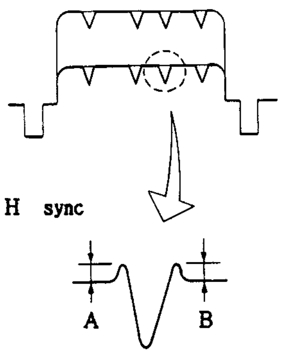
SWEEP GENERATOR SIGNAL LEVEL


3.43
5.4
0
1
2
4.43
6
MHz
0.3V
0.35V
0.3V

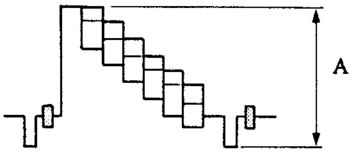
11-11. PB Y PHASE EQUALIZER ADJUSTMENT (SP and High modes)

machine conditions for adjustment	specifications	adjustments
Step 1. · Turn S1/VP-26(B-2) to ON. · Play back the pulse & bar segment of the alignment tape RR5-1SD PAL.	TP8/VP-26(B-2)  A = B	⊘RV3/VP-26(E-6)
Step 2. · Play back the pulse & bar segment of the alignment tape RR5-2SB PAL. · After the adjustment is completed, turn S1 to OFF.	 C = D	⊘RV2/VP-26(E-6) TRIG: TP9/CO-7A(G-6)

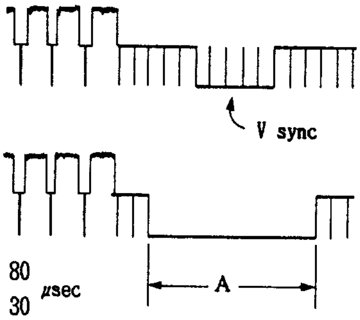
11-12. PB Y PHASE EQUALIZER ADJUSTMENT (Low mode)

machine conditions for adjustment	specifications	adjustments
· Play back the monoscope segment of the alignment tape RRS-ISC PAL if(B/W) S1 should be turnedf OFF.	TP8/VP-26(B-2)  A = B	⊘RV107/VP-26(E-7) TRIG: TP9/CO-7A(G-6)

11-13. Y OUTPUT LEVEL ADJUSTMENT

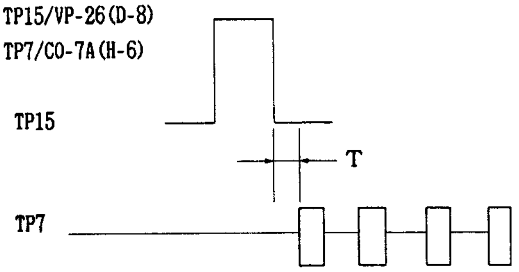
machine conditions for adjustment	specifications	adjustments
· Play back the color-bar segment of the alignment tape RR5-1SD PAL.	VIDEO OUT (terminated by 75Ω)  A = 1.0 ± 0.02 Vp-p	⊘RV20/VP-26(F-3) TRIG: TP9/CO-7A(G-6)

11-14. FALSE VD PULSE WIDTH ADJUSTMENT

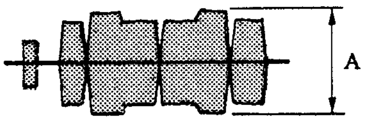
machine conditions for adjustment	specifications	adjustments
· Play back the color-bar segment of the alignment tape RR5-1SD PAL. · PAUSE mode	TP4/VP-26(G-2) (PLAY mode) (PAUSE mode)  $A = 320 {}^{+80}_{-30}$ μsec	⊘RV105/CO-7A(E-6) TRIG: TP16/CO-7A(H-6)

11-15. CHROMA SYSTEM ADJUSTMENT

11-15-1. T/C Mute Pulse Width Adjustment

machine conditions for adjustment	specifications	adjustments
· Play back the pseudo color-bar segment of the alignment tape RR5-1SD PAL.	TP15/VP-26(D-8) TP7/CO-7A(H-6)  T = 30 ± 10 μsec (the position between V BLK falling edge and starting point of TP7 burst)	⊘RV34/VP-26(D-7) TRIG: TP16/CO-7A(H-6) SLOP (+)

11-15-2. Chroma Input Level Adjustment

machine conditions for adjustment	specifications	adjustments
· Play back the color-bar segment of the alignment tape RR5-1SD PAL.	TP7/CO-7A(H-6)  A = 0.2 ± 0.01 V	⊘RV37/VP-26(K-5) TRIG: TP2/CO-7A

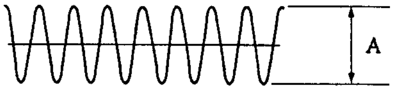
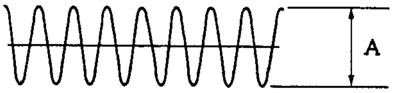
11-15-3. PB REF OSC Adjustment

machine conditions for adjustment	specifications	adjustments
· Play back the color-bar segment of the alignment tape RR5-1SD PAL.	TP11/CO-7A(G-6) Step 1. Maximize	⊘LV4/CO-7A(A-6)
	Step 2. 4,433,619 ± 5 Hz	⊘RV100/CO-7A(C-5)

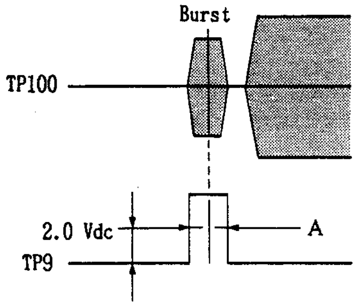
11-15-4. VCO DC Level Adjustment

machine conditions for adjustment	specifications	adjustments
Step 1. · Play back the color-bar segment of the alignment tape RR5-1SD PAL.	TP12/CO-7A (G-7) DC Level = 8.4 ± 0.1 Vdc	⊘RV103/CO-7A (A-3)
Step 2. · Play back the color-bar segment of the alignment tape RR5-2SC PAL.	TP12/CO-7A (G-7) DC Level = 8.5 ± 0.1 Vdc	⊘RV104/CO-7A (A-4)

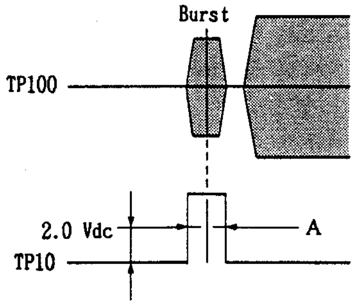
11-15-5. 5.3MHz OSC Level Adjustment

machine conditions for adjustment	specifications	adjustments
Step 1. · Play back the color-bar segment of the alignment tape RR5-1SD PAL.	TP14/CO-7A (H-5)  Adjust LV2 and LV3 alternately so that the level A is maximized.	⊘LV2/CO-7A (B-1) ⊘LV3/CO-7A (B-1)
Step 2. · Play back the color-bar segment of the alignment tape RR5-1SD PAL.	TP14/CO-7A (H-5)  A = 0.6 ± 0.03 Vp-p	⊘RV3/CO-7A (C-1) TRIG: TP16/CO-7A (H-6)

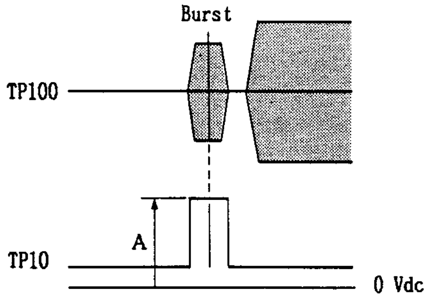
11-15-6. ACC Burst Gate Width/Phase Adjustment

machine conditions for adjustment	specifications	adjustments
• Play back the color-bar segment of the alignment tape RR5-1SD PAL.	TP100/CO-7A(H-6) TP9/CO-7A(G-6)  Width: A = 2.2 ± 0.1 µs Phase: Adjust the center of both waves.	Pulse width: ⊘RV8/CO-7A(C-7) Phase: ⊘RV7/CO-7A(C-7) TRIG: TP2/CO-7A(A-2)

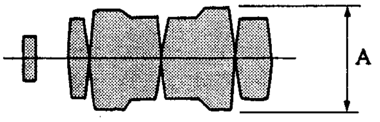
11-15-7. APC Burst Gate Width/Phase Adjustment

machine conditions for adjustment	specifications	adjustments
• Play back the color-bar segment of the alignment tape RR5-1SD PAL.	TP100/CO-7A(H-6) TP10/CO-7A(G-7)  Width: A = 2.2 ± 0.1 µs Phase: Adjust the center of both waves.	Phase: ⊘RV11/CO-7A(C-6) Pulse width: ⊘RV9/CO-7A(B-8) TRIG: TP2/CO-7A(A-2)

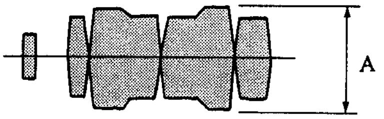
11-15-8. APC Burst Gate Level Adjustment

machine conditions for adjustment	specifications	adjustments
· Play back the color-bar segment of the alignment tape RR5-1SD PAL.	TP100/CO-7A(H-6) TP10/CO-7A(G-7)  A = 3.9 ± 0.1 Vdc	⊘RV6/CO-7A(B-6) TRIG: TP2/CO-7A(A-2)

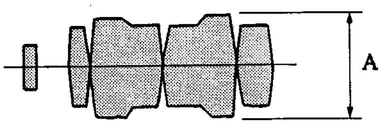
11-15-9. PB ACC Level Adjustment (High-band mode)

machine conditions for adjustment	specifications	adjustments
· Play back the color-bar segment of the alignment tape RR5-2SB PAL.	TP13/CO-7A(H-5)  A = 0.8 ± 0.1 Vp-p	⊘RV21/CO-7A(J-5) TRIG: TP2/CO-7A(A-2)

11-15-10. PB ACC Level Adjustment (SP mode)

machine conditions for adjustment	specifications	adjustments
· Play back the color-bar segment of the alignment tape RR5-1SD PAL.	TP13/CO-7A(H-5)  A = 0.8 ± 0.1 Vp-p	⊘RV102/CO-7A(H-4) TRIG: TP2/CO-7A(A-2)

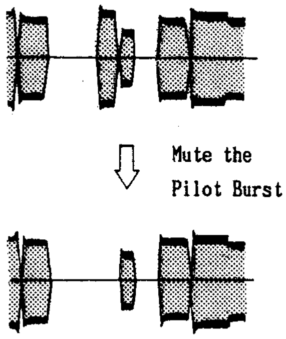
11-15-11. PB ACC Level Adjustment (Low-band mode)

machine conditions for adjustment	specifications	adjustments
· Play back the color-bar segment of the alignment tape RR5-2SC PAL.	TP13/CO-7A(H-5)  A = 0.8 ± 0.1 Vp-p	⊘RV22/CO-7A(J-5) TRIG: TP2/CO-7A(A-2)

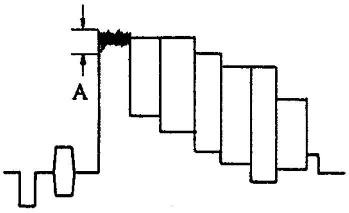
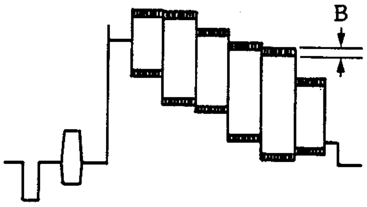
11-15-12. TBC Mode APC Adjustment

machine conditions for adjustment	specifications	adjustments
· Short between TP104(IC20 pin 1)/ CO-7A(A-7) and E1/CO-7(H-7) with a shorting clip. · TBC switch: ON · Play back the color-bar segment of the alignment tape RR5-1SD PAL. · SERCH FWD→STILL · SERCH REV→STILL · After the adjustment is completed, remove the shorting clip.	TP12/CO-7A(G-7) SERCH FWD→STILL mode 9.15 ± 0.05 Vdc (at STILL mode)	⊘RV106/CO-7A(B-7)
	TP12/CO-7A(G-7) SERCH REV→STILL mode 7.7 ± 0.05 Vdc (at STILL mode)	⊘RV107/CO-7A(B-6)

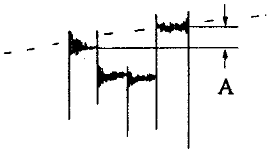
11-15-13. Pilot Burst Mute Pulse Adjustment

machine conditions for adjustment	specifications	adjustments
• Play back the color-bar segment of the alignment tape RR5-1SD PAL.	VIDEO OUT 1/connector panel 	⊘RV10/CO-7A(C-7) TRIG: TP2/CO-7A(A-2)

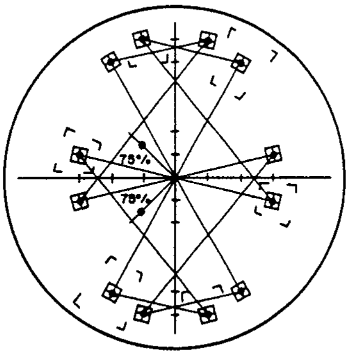
11-15-14. Converter Balance Adjustment

machine conditions for adjustment	specifications	adjustments
Step 1. • Play back the color-bar segment of the alignment tape RR5-2SB PAL.	VIDEO OUT 1/connector panel  Minimize the A level.	⊘RV18/CO-7A(H-6)
Step 2. • Play back the color-bar segment of the alignment tape RR5-2SC PAL.	VIDEO OUT 1/connector panel  Minimize the B level.	⊘CT100/CO-7A(H-8) TRIG: TP2/CO-7A(A-2)

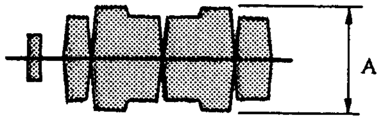
11-15-15. DG Compensator Pre-adjustment

machine conditions for adjustment	specifications	adjustments
Step 1. low band adj. · Play back the color-bar segment of the alignment tape RR5-2SC PAL.	VIDEO OUT (terminated by 75Ω) vectorscope (DG mode)  A = 0	· low mode adj. ⊘RV23/CO-7A(J-7)
Step 2. SP mode adj. · Play back the color-bar segment of the alignment tape RR5-1SD PAL.		· SP mode adj. ⊘RV24/CO-7A(J-7)

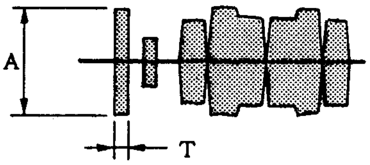
11-15-16. Y/C Mix Adjustment

machine conditions for adjustment	specifications	adjustments
Step 1. high mode adj. · Play back the color-bar segment of the alignment tape RR5-1SD PAL.	VIDEO OUT connector (terminated by 75Ω) Vectorscope  R should be located inside the ⊞.	· high mode adj. ⊘RV21/CO-7A(J-5)
Step 2. SP mode adj. · Play back the color-bar segment of the alignment tape RR5-1SD PAL.		· SP mode adj. ⊘RV102/CO-7A(H-4)
Step 3. low mode adj. · Play back the color-bar segment of the alignment tape RR5-2SC PAL.		· low mode adj. ⊘RV22/CO-7A(J-5)

11-15-17. DUB Chroma Output Level Adjustment

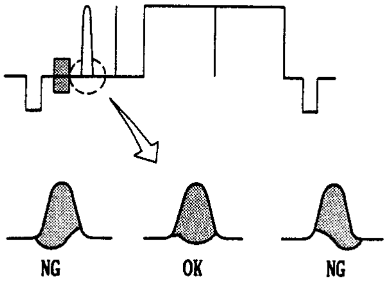
machine conditions for adjustment	specifications	adjustments
· Play back the color-bar segment of the alignment tape RR5-1SD PAL.	TP6/CO-7A(F-6)  A = 1.0 ± 0.1 Vp-p	⊘RV13/CO-7A(F-3)

11-15-18. Pilot Burst Adjustment

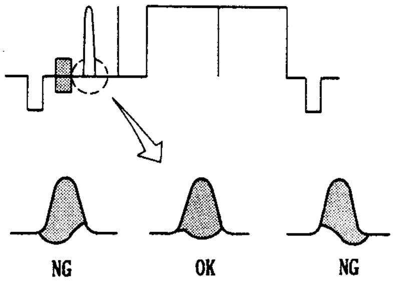
machine conditions for adjustment	specifications	adjustments
· Play back the color-bar segment of the alignment tape RR5-1SD PAL.	IC2 pin 7/CO-7A(C-3) TP7/CO-7A(H-6)  T: 3.5 ± 0.1 μs	⊘RV4/CO-7A(B-3)

11-16. PB Y/C DELAY ADJUSTMENT

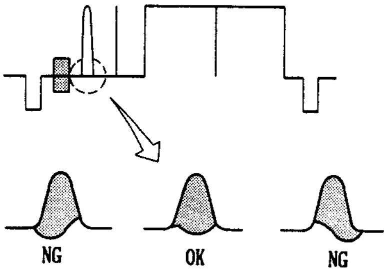
11-16-1. PB Y/C Delay Adjustment (SP mode)

machine conditions for adjustment	specifications	adjustments
· Play back the pulse & bar(color) segment of the alignment tape RR5-1SD PAL.	VIDEO OUT 1 (terminated by 75Ω)  0 ± 50 ns	⊘RV25/CO-7A(H-4) TRIG: TP2/CO-7A(A-2)

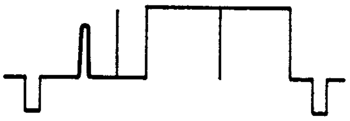
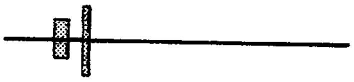
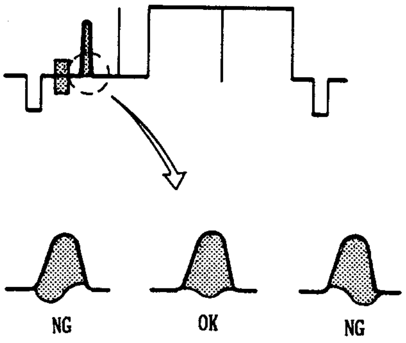
11-16-2. PB Y/C Delay Adjustment (High-band mode)

machine conditions for adjustment	specifications	adjustments
· Play back the mod 20T pulse segment of the alignment tape RR5-2SB PAL.	VIDEO OUT 1 (terminated by 75Ω)  0 ± 50 ns	⊘RV16/CO-7A(G-4)

11-16-3. PB Y/C Delay Adjustment (Low-band mode)

machine conditions for adjustment	specifications	adjustments
· Play back the mod 20T pulse segment of the alignment tape RR5-2SC PAL.	VIDEO OUT 1 (terminated by 75Ω)  0 ± 60 ns	⊘RV17/CO-7A(G-5)

11-16-4. DUB Y/C Delay Adjustment (SP mode)

machine conditions for adjustment	specifications	adjustments
· Play back the pulse & bar segment of the alignment tape RR5-1SD PAL.	TP11/VO-17(F-8)  TP6/CO-7(F-6)  ADD mode  0 ± 50 ns	⊘RV14/CO-7A(F-4) TRIG: TP2/CO-7A(A-2)